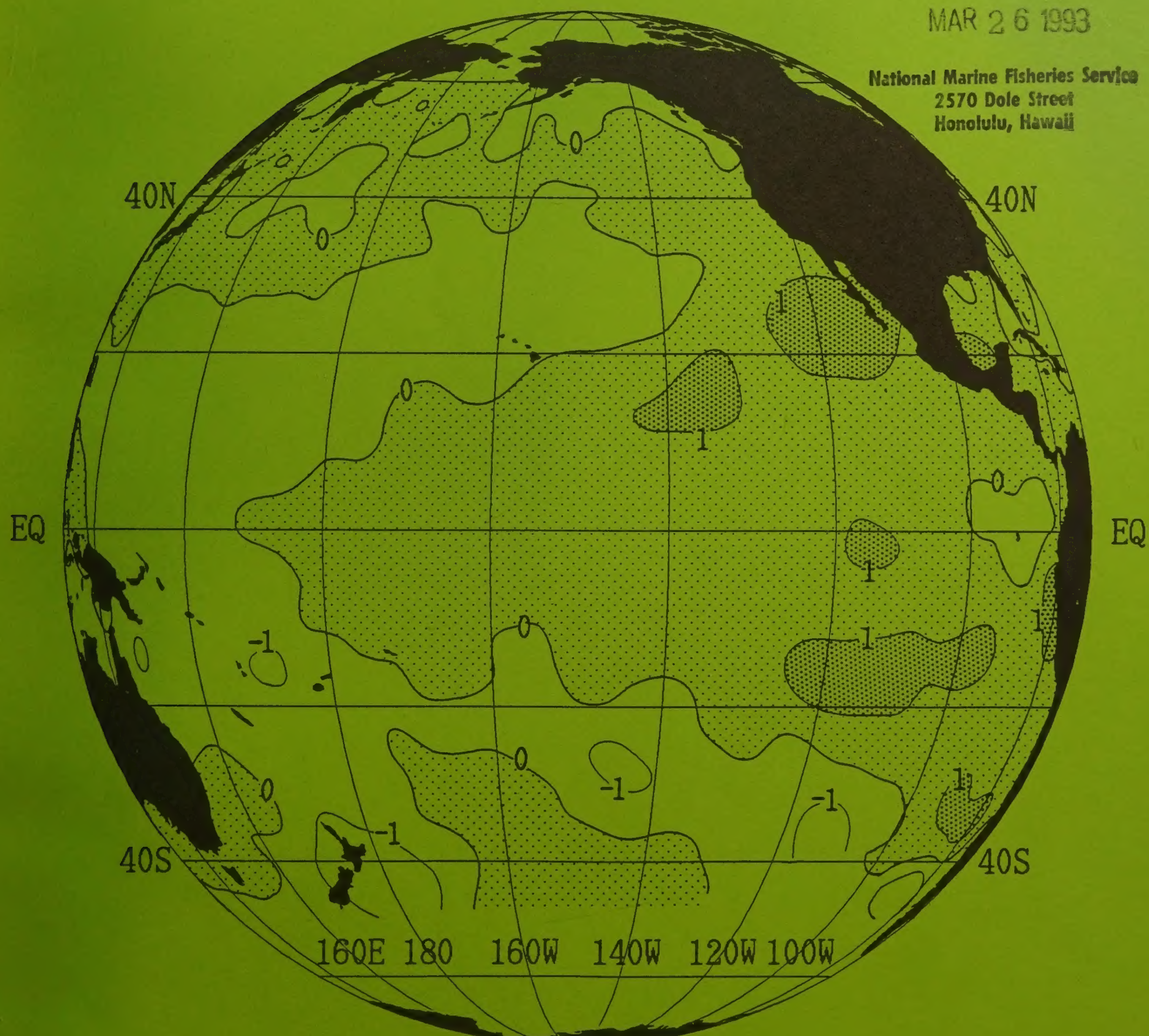
気象庁海洋月報

Monthly Ocean Report

February 1993 (No.2)



El Niño Monitoring Center
Japan Meteorological Agency

気象庁海洋気象部海洋課
エルニーニョ監視センター

・平成5年2月

気象庁海洋月報は、気象庁海洋気象部海洋課エルニーニョ監視センターで
作成されています。本月報に関する問い合わせは、
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電話 03-3212-8341(内線5134,5135) ファクシミリ 03-3211-3047

Monthly Ocean Report is prepared by the El Niño Monitoring Center (ENMOC), Oceanographical Division, Marine Department, Japan Meteorological Agency.

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表紙は1993年２月の太平洋の月平均海面水温偏差図です。
陰影部は平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for February 1993 in the Pacific Ocean. Areas of positive anomalies are shaded.

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海況の特徴（1993年2月）

太平洋の海況

太平洋赤道域の海面水温は日付変更線以東で平年より高く、120°W付近で1℃以上高かった。また、15°S・120°Wからペルー沖にかけても1℃以上高かった。エルニーニョ監視海域（4°S-4°N,150°W-90°W）の海面水温の偏差は、+0.4℃と昨年8月以来最も大きくなった（第1表、第1図、第6図）。

赤道域の水温躍層は、西部では依然として浅く、中部では深い状態が続いているが、東部では平年並に近い状態に戻っている（第9図）。本年1月に実施した気象庁の海洋気象観測船「凌風丸」による日本近海から赤道域に至る137°Eに沿う海洋観測結果によれば、北西太平洋熱帯域の表層水温は、エルニーニョ現象が最盛期を迎えていた昨年1月に比べ平年の状態に近い（本月報、No.1参照）。

なお、同船によって実施された137°Eに沿う洋上大気中の二酸化炭素濃度の観測結果についてⅲページに紹介した。

北太平洋の海面水温は、30°N以南の、フィリピン諸島からハワイ諸島にかけて平年より低かったが、30°N以北には正偏差域が広がっていた。また、カリフォルニア半島沖では平年より1℃以上高かった（第1図）。

日本近海の海況

日本近海の海面水温は、三陸沖から常磐沖にかけて平年より1℃低いほかは全般に平年より高かった（第17図）。

黒潮は、九州からやや離岸して流れ、紀伊半島に接岸した後、三宅島付近を経て房総半島沖を北東に流れていた（第20図）。

本州東方の親潮系の冷水（深さ100mで5℃以下）は、38.8°N·144.3°Eまで達していた（第19図）。

熱帯の気象

対流活動は中部熱帯太平洋で平年より活発で、海洋大陸付近では平年より不活発であった（第1表、第13図）。ＳＯＩは-0.6と今月も負の値だった。200hPaの赤道太平洋域は弱い東風偏差、850hPaの赤道太平洋域は東部と中部でほぼ平年並、西部では西風偏差であった（第1表、第12図）。これらのことから判断すると、東西循環は平年よりやや弱かった。

［気象庁長期予報課提供］

HIGHLIGHTS February 1993

Pacific

Sea surface temperatures (SSTs) in the equatorial Pacific were higher than normal east of the date line. SSTs around 120°W on the equator and from 15°S,120°W to off Peru were more than 1°C above normal. The SST index for region B (refer to Fig.6) was +0.4°C which was greater than the values for the last six consecutive months (Table 1 and Figs.1,6).

The thermocline was shallower (deeper) than normal in the western (central) equatorial Pacific and near normal in the eastern equatorial Pacific (Fig.9). According to the oceanographic observations by R/V Ryofu Maru of the JMA from 34°N to 3°N along the meridian of 137°E, the subsurface temperatures in January 1993 were closer to normal than those in January 1992, the mature phase of the last El Niño event (cf. Monthly Ocean Report No.1).

Features of the concentration of atmospheric carbon dioxide observed by R/V Ryofu Maru along the meridian of 137°E are inserted on page iii.

In the North Pacific Ocean, SSTs south of 30°N from the Philippines to Hawaii were lower than normal, while those north of 30°N were higher than normal. SSTs off Baja California were 1°C higher than normal (Fig.1).

Seas adjacent to Japan

SSTs were higher than normal in seas adjacent to Japan except for the area from off Sanriku to off Joban where they were 1°C lower than normal (Fig.17).

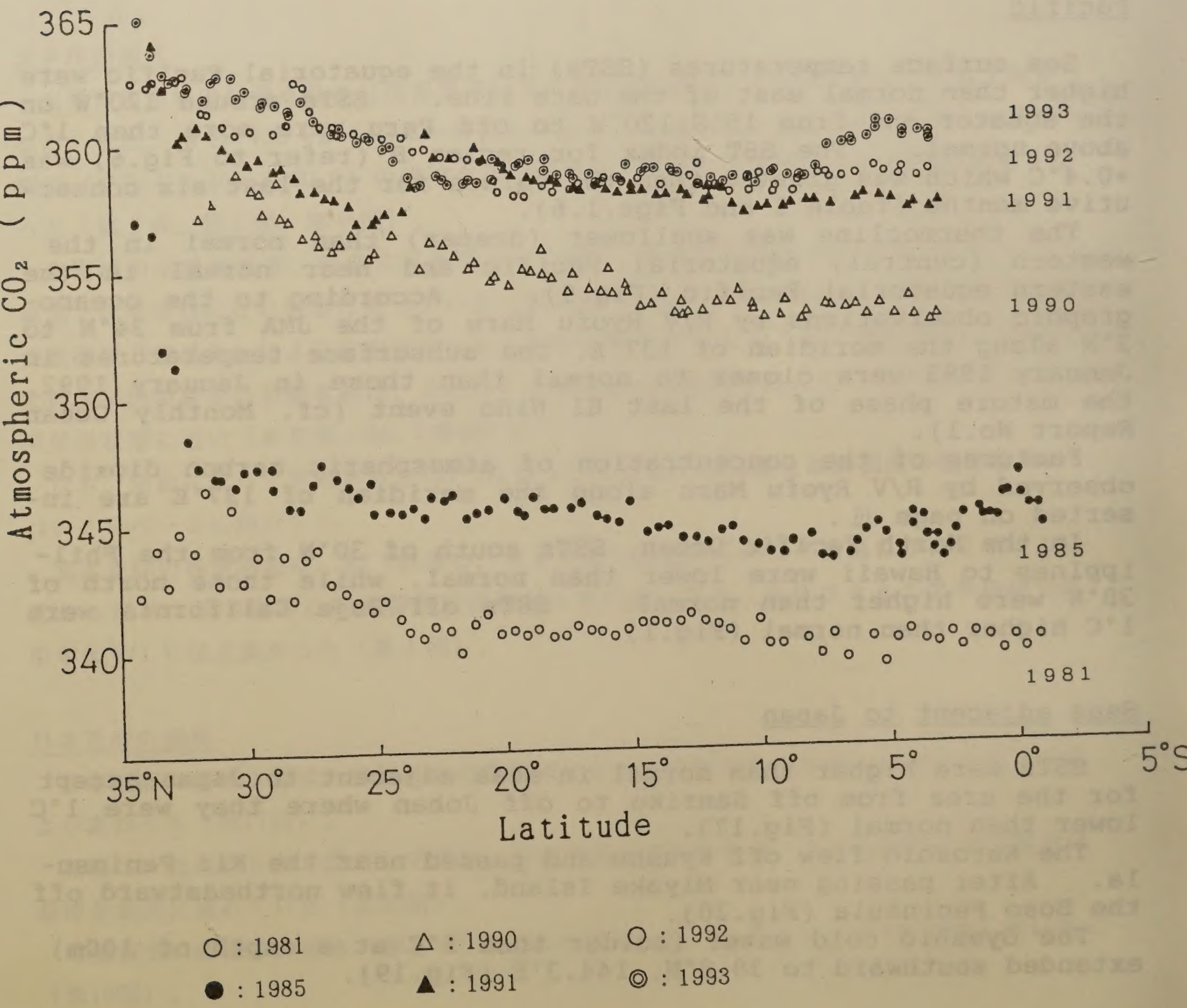
The Kuroshio flew off Kyushu and passed near the Kii Peninsula. After passing near Miyake Island, it flew northeastward off the Boso Peninsula (Fig.20).

The Oyashio cold water (colder than 5°C at a depth of 100m) extended southward to 38.8°N, 144.3°E (Fig.19).

Atmospheric conditions in the tropics

Convective activity was stronger than normal in the central equatorial Pacific and weaker than normal in the western equatorial Pacific (Table 1 and Fig.13). The SOI was still negative (-0.6) because sea level pressure anomaly at Tahiti was still negative. The low level easterly was weaker than normal in the western equatorial Pacific and the upper level westerly was slightly weaker than normal over the equatorial Pacific. These indicate that the Walker circulation was slightly weaker than normal (Table 1 and Fig.12). [prepared by the Long-range Forecast Division, JMA]

The Concentration of Atmospheric CO_2 along 137°E



図A　137°Eに沿う洋上大気中の二酸化炭素濃度(ppm)。
（気象庁凌風丸による1981、85、90~93年1月の観測結果）

Fig.A The concentration of atmospheric CO_2 along the meridian of 137°E observed by R/V Ryofu Maru of JMA in the six winters of 1981, 1985 and 1990-93.

The meridionally averaged concentration of CO_2 increased by 4.6ppm (1.5ppm/year) from 1990 to 1993. The rate of increase changes significantly from year to year in the last 3 years.

Further information is available at the Pollutants Chemical Analysis Center, Oceanographical Division, JMA.

El Niño Monitoring Indices

Date		1991 SEP	OCT	NOV	DEC	1992 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1993 JAN	FEB
Pacific Sea Surface Temperature (℃)																			
D	(14N~ Eq.)	29.0	29.1	29.1	28.6	28.1	28.0	27.9	28.7	29.1	29.4	29.1	29.1	29.2	29.5	29.0	28.7	28.0	28.0
	(130E~150E)	-0.2	-0.2	-0.1	-0.3	-0.4	-0.3	-0.5	-0.1	0.0	+0.1	-0.1	0.0	0.0	+0.2	-0.2	-0.2	-0.5	-0.3
A	(4N~ 4S)	29.2	29.5	29.4	29.4	28.9	29.0	28.9	29.2	29.4	29.2	29.2	29.1	28.8	28.8	28.7	28.8	28.5	28.4
	(160E~150W)	+0.9	+1.1	+1.0	+1.2	+0.9	+1.0	+0.8	+1.0	+0.9	+0.7	+0.7	+0.7	+0.5	+0.4	+0.3	+0.6	+0.5	+0.4
B	(4N~ 4S)	25.0	25.4	25.8	26.1	26.8	27.6	28.0	28.5	28.3	26.9	25.6	24.6	24.5	24.6	24.7	25.0	25.5	26.6
	(150W~ 90W)	+0.4	+0.8	+1.2	+1.2	+1.4	+1.4	+1.1	+1.4	+1.7	+0.8	+0.4	0.0	-0.1	0.0	+0.1	+0.1	+0.1	+0.4
C	(Eq.~ 10S)	20.8	21.2	22.3	23.2	25.1	26.8	27.5	28.0	26.4	23.7	21.6	20.5	20.2	20.8	21.2	22.5	24.3	26.1
	(90W~ 80W)	+0.5	+0.5	+0.8	+0.6	+0.8	+1.1	+1.6	+2.9	+2.5	+1.0	0.0	-0.1	-0.1	+0.1	-0.3	-0.1	0.0	+0.4
Pacific Sea Level Anomaly (cm)																			
YAP	(10N,138E)	-3	7	6	8	-2	-2	2	1	6	5	-2	-3	2	9	6	8	7	
RABAUL	(4S,152E)	-2	-2	-2	-7	-13	-18	-18	-18	-20	-18	-13	-11	-10	-6	-6	-6	-9	
MAJURO	(7N,171E)	-4	-2	-9	-14	-12	-9	-7	0	-2	4	7	7	11	15	6	4	-1	
TARAWA	(1N,173E)	18	15	14	0	1	-3	-4	-7	-2	-2	2	3	5	2	2	4	1	
CHRISTMAS	(2N,157W)	6	11	10	15	18	15	15	7	5	-3	-2	-7	-4	-3	4	1	5	
SANTA CRUZ	(1S, 90W)	-2	5	12	7	18	20	18	8	4	-4	-1	-1	-3	-1	-1	-2	4	

第1表 (a) エルニーニョ監視指数

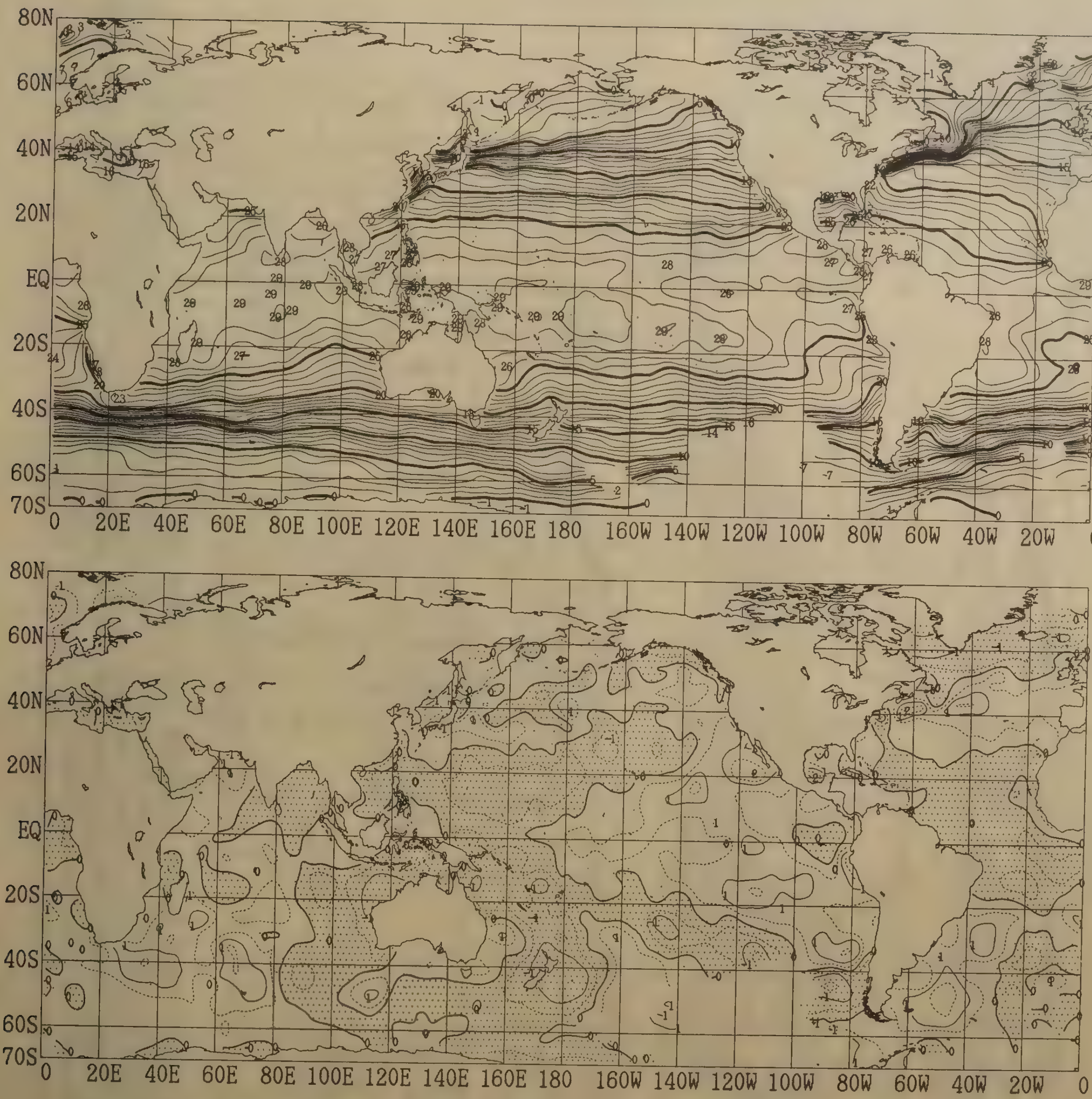
Table 1(a) El Niño monitoring indices. Data sources are the El Niño Monitoring Center, JMA for the sea surface temperature and the SOC of ISLP-PAC, Dept. of Oceanography, University of Hawaii for the sea level anomaly.

Date	1991			1992												1993	
	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Southern Oscillation Index (Unit of pressure anomalies at Tahiti and Darwin : hPa)																		
SOI (TAHITI-DARWIN)	-1.6	-1.5	-0.6	-1.8	-2.5	-0.8	-2.0	-1.6	-0.1	-1.3	-0.5	0.1	-0.0	-2.0	-0.6	-0.5	-0.8	-0.6
TAHITI (17.5S , 150W)	-1.6	-1.7	0.1	-2.1	-1.7	-0.9	-1.5	-0.8	0.0	-1.6	0.7	0.1	-0.8	-2.3	-0.5	-1.1	-1.4	-1.9
DARWIN (12.5S , 131E)	1.3	0.4	1.2	1.0	3.7	1.0	2.8	1.4	0.1	-0.1	1.6	-0.1	-0.8	0.5	0.6	-0.2	0.4	-0.3
High Cloud Amount Index																		
HCLD-PH (20N ~ 10N) (110E ~ 140E)	1.4	-0.5	-1.5	-1.9	-1.0	-1.2	-1.1	-1.0	-1.5	-1.1	-0.3	0.2	-1.6	0.9	-1.7	-1.4	-1.0	-0.3
HCLD-MC (5N ~ 5S) (110E ~ 135E)	-1.3	-1.7	-1.8	-0.7	-2.2	-1.4	-1.4	-1.0	-1.0	-0.7	-0.5	-1.2	-0.4	0.6	-0.8	0.4	-1.1	-0.9
HCLD-DL (5N ~ 5S) (170E ~ 170W)	0.2	0.4	2.9	1.3	1.6	1.0	1.8	2.3	2.0	1.7	0.0	0.1	-0.6	-0.1	1.3	1.2	0.8	1.4
Equatorial Zonal Wind Index																		
U200-IN (5N ~ 5S) (80E ~ 100E)	0.1	-0.7	0.2	0.6	1.2	-1.3	0.5	0.1	0.6	0.2	-0.4	-0.4	-1.1	-1.4	0.1	0.1	-0.1	0.8
U200-CP (5N ~ 5S) (180 ~ 125W)	-0.5	-0.4	0.0	-0.4	0.0	-0.8	-0.8	-0.9	-1.1	-0.1	0.0	1.1	-0.4	0.7	-0.2	0.7	-0.3	-0.3
U850-WP (5N ~ 5S) (160E ~ 175W)	0.3	0.1	1.6	1.4	1.8	0.6	1.0	0.9	0.6	0.1	0.1	-0.4	0.2	0.2	0.4	0.8	0.3	0.9
U850-CP (5N ~ 5S) (170W ~ 135W)	0.5	0.7	0.9	1.0	1.8	0.8	1.1	0.8	0.9	0.1	0.3	-0.7	0.5	-0.4	0.9	0.2	0.2	0.0
U850-EP (5N ~ 5S) (130W ~ 100W)	-0.0	0.3	0.4	-0.3	1.6	0.0	0.3	0.2	0.5	0.4	-0.1	-0.9	0.6	-1.2	1.9	-0.0	0.1	-0.1

第１表 (b) エルニーニョ監視指数(続き)

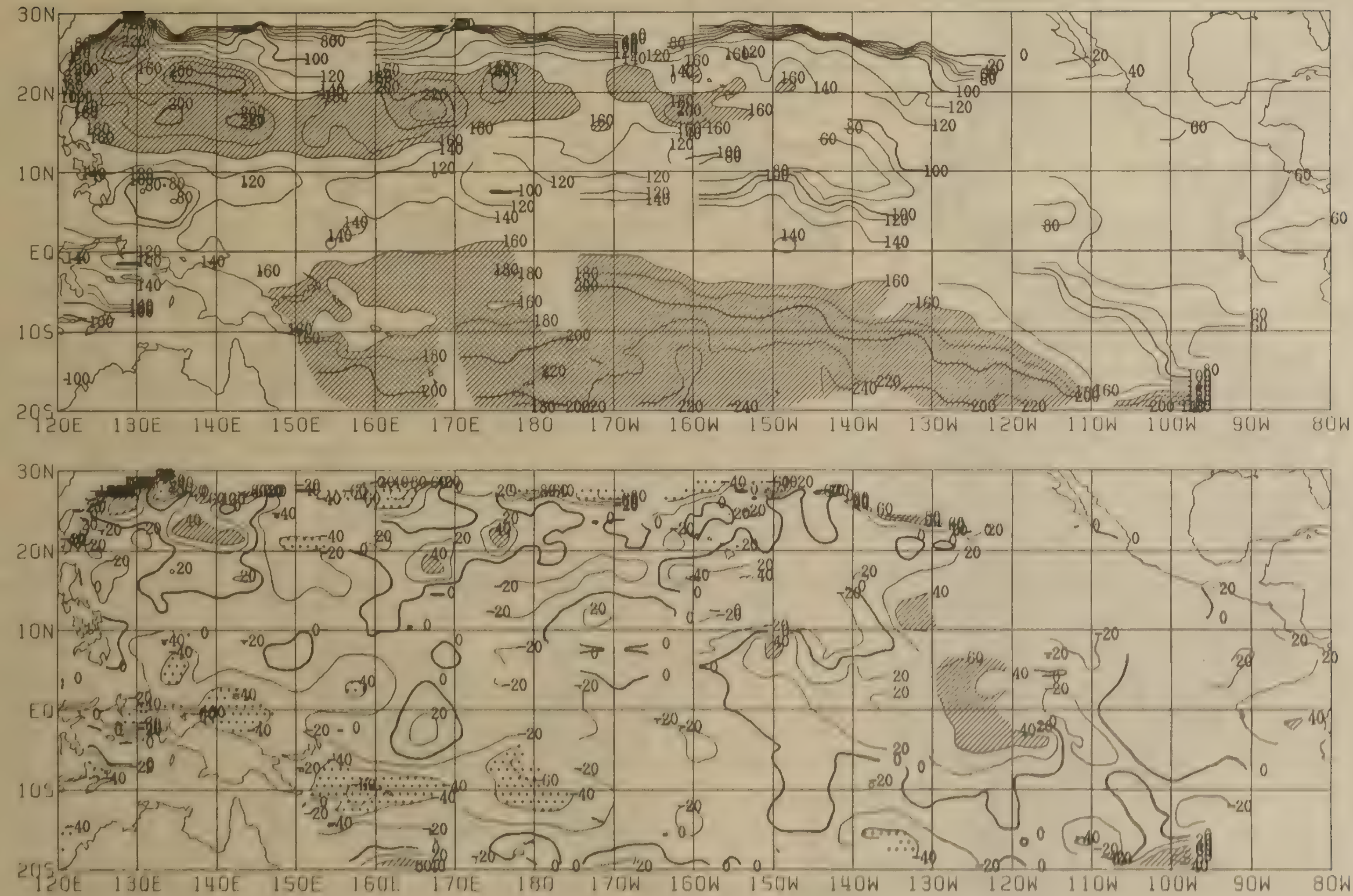
Table 1(b) El Niño monitoring indices (continued) .

Data source for these atmospheric conditions is the Long-range Forecast Division, JMA.



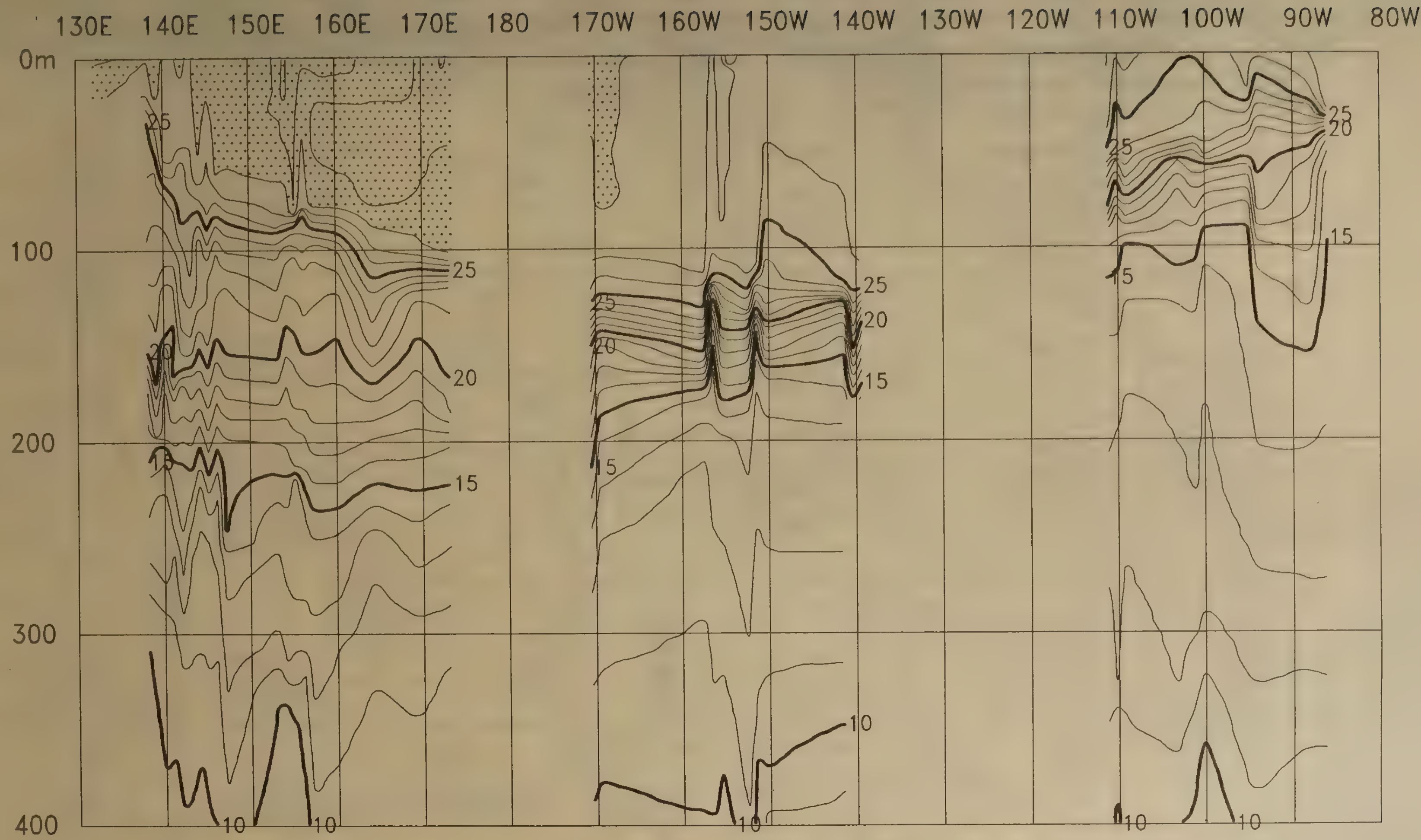
第１図　全球月平均海面水温図（上）及び偏差図（下）（1993年 2月）

Fig.1 Monthly mean sea surface temperature in the global ocean (top) and anomalies (bottom) for FEB 1993. Anomalies are computed with respect to the JMA climatology (1961–90) (Climatic charts of sea surface temperatures of the western North Pacific and the global ocean, March 1991). The Contour interval is 1°C and additional anomaly contours of ±0.5°C are shown as broken lines. Negative anomalies are stippled.



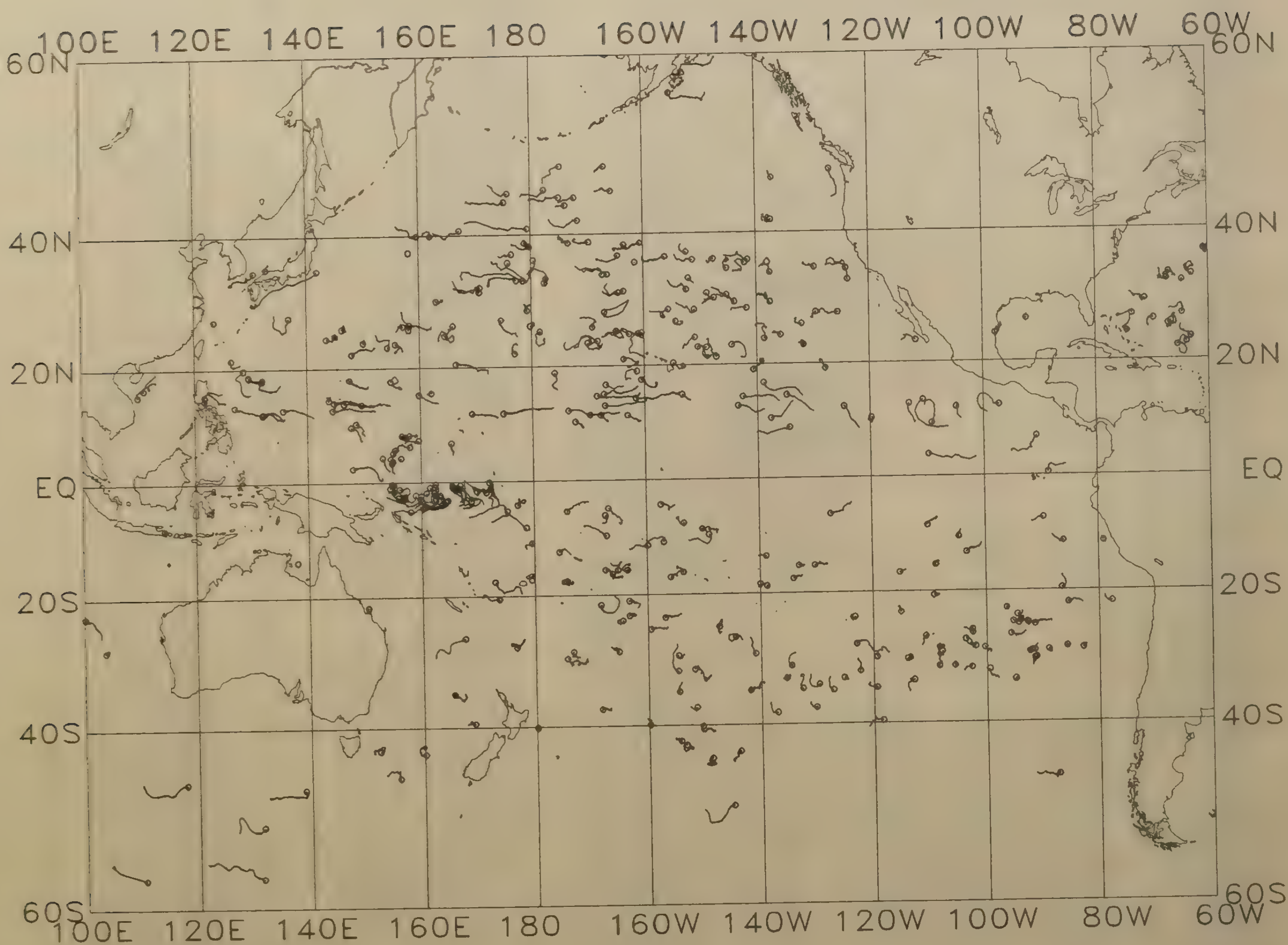
第2図 太平洋表層水温（20℃深度）図（上）及び偏差図（下）（1993年 2月）

Fig.2 The depth of a 20°C isotherm in the Pacific Ocean (top) and anomalies (bottom) for FEB 1993. Anomalies are computed with respect to the climatology (Levitus, 1982, Climatological Atlas of the World Ocean, NOAA).
The contour interval is 20m with shading for values greater than 160m (top), and shading/stippling for values greater/smaller than +40m/−40m (bottom).



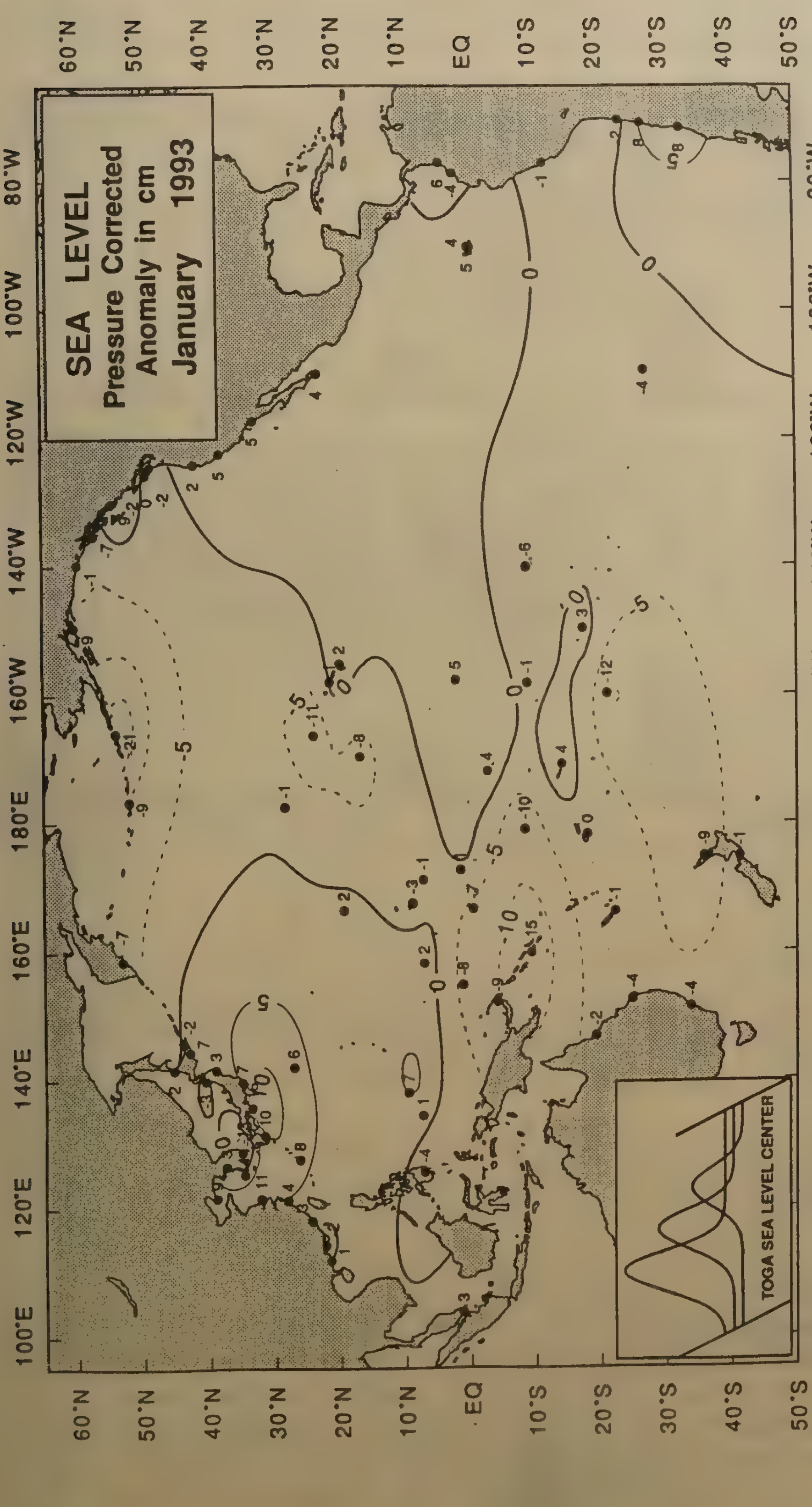
第３図　太平洋赤道に沿う表層水温断面図（1993年 2月）

Fig.3 Depth–longitude section of the Pacific Ocean temperature along the equator for FEB 1993. The contour interval is 1° C with spotted shading for values greater than 28° C.



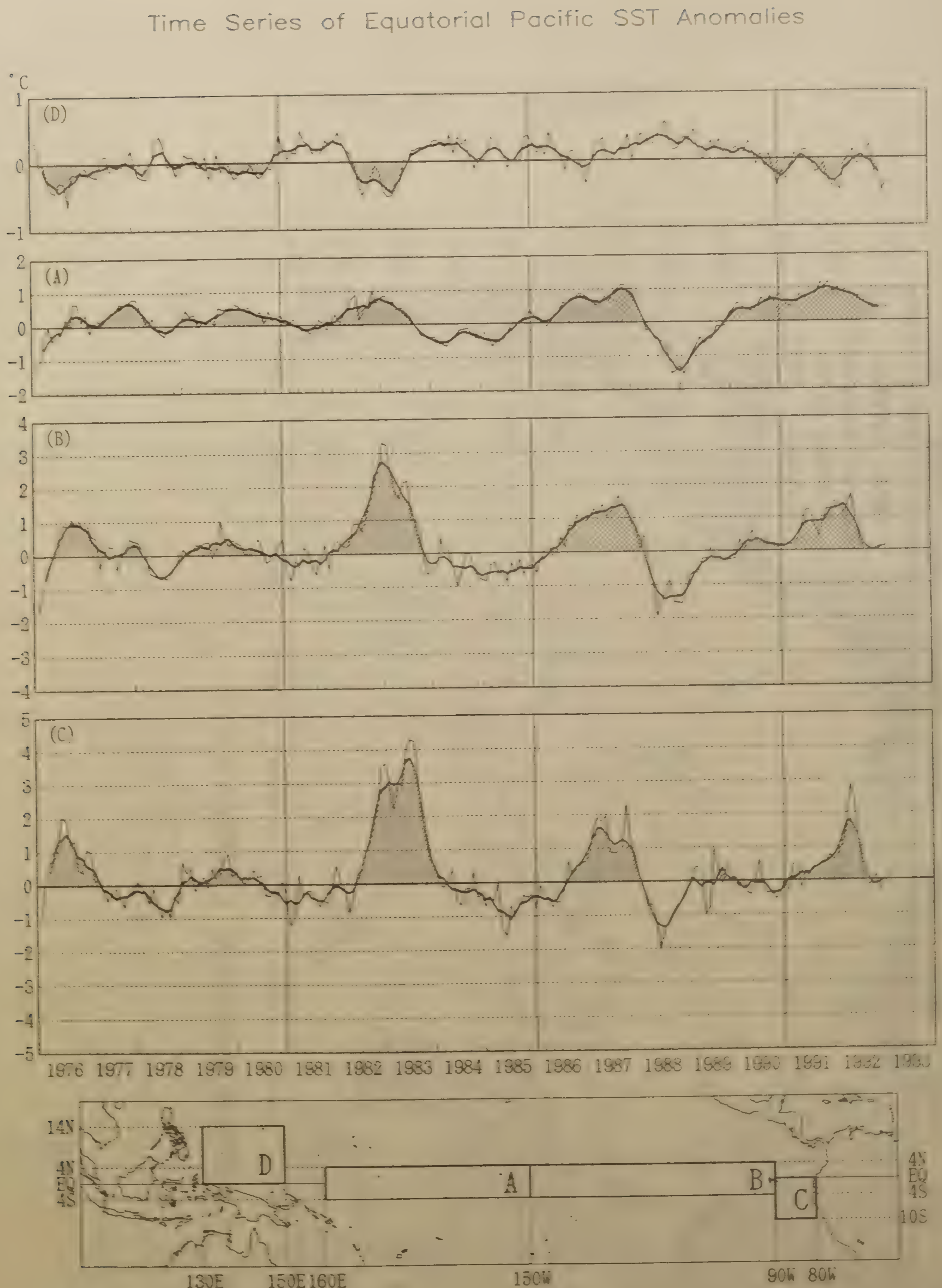
第4図　太平洋ブイ流跡図(1993年 2月)

Fig.4 Movements of drifting buoys in the Pacific Ocean during FEB 1993. Each track is one buoy, with the small circle representing the buoy's last position for the month.



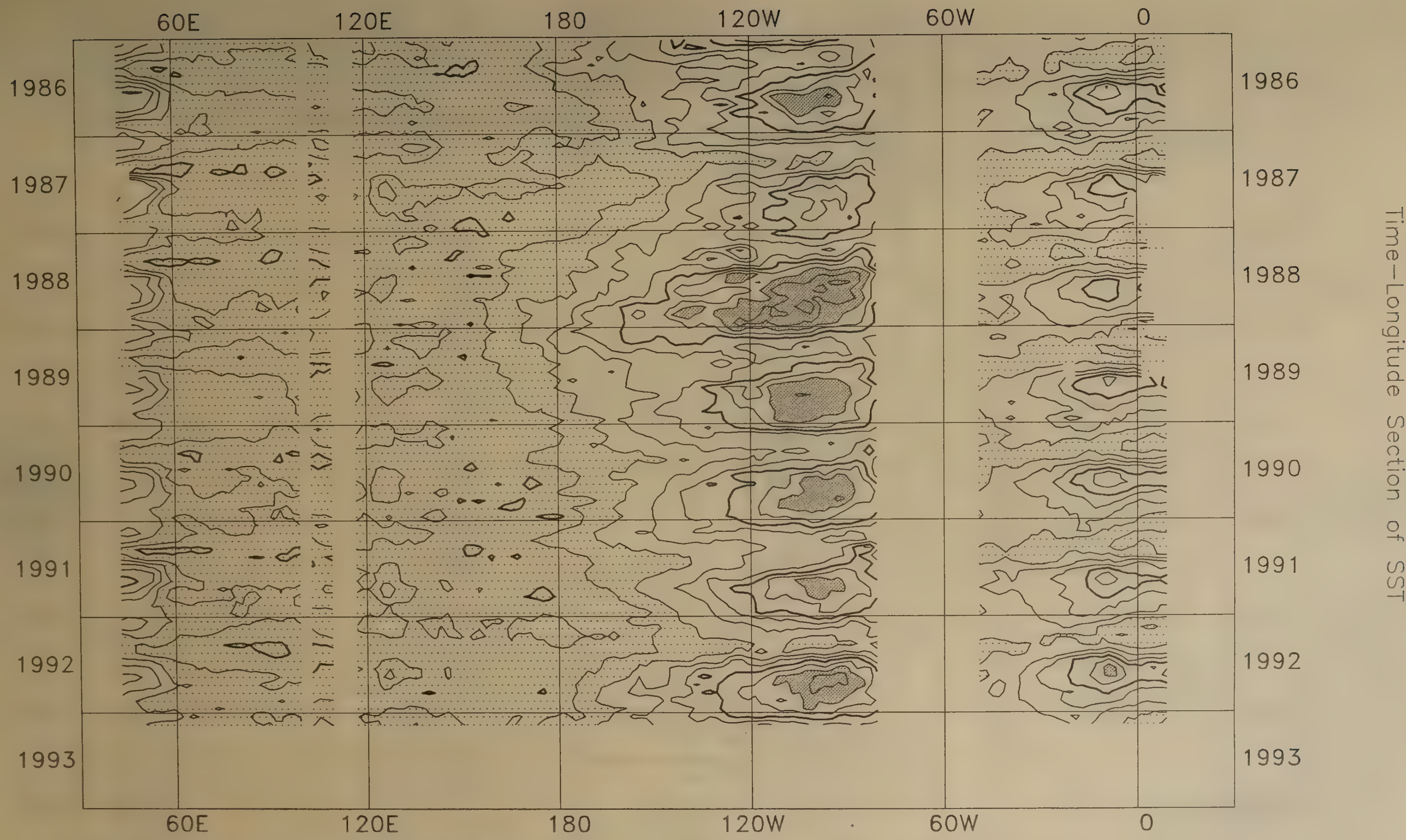
第5図　太平洋海面水位偏差図（1993年1月）

Fig.5 Sea level anomalies obtained from the 1975 to 1986 mean JAN sea level adjusted for atmospheric pressure (JAN 1993).
This figure is prepared by the SOC of ISLP–PAC, Dept. of Oceanography, Univ. of Hawaii.



第６図　赤道太平洋海面水温偏差時系列図

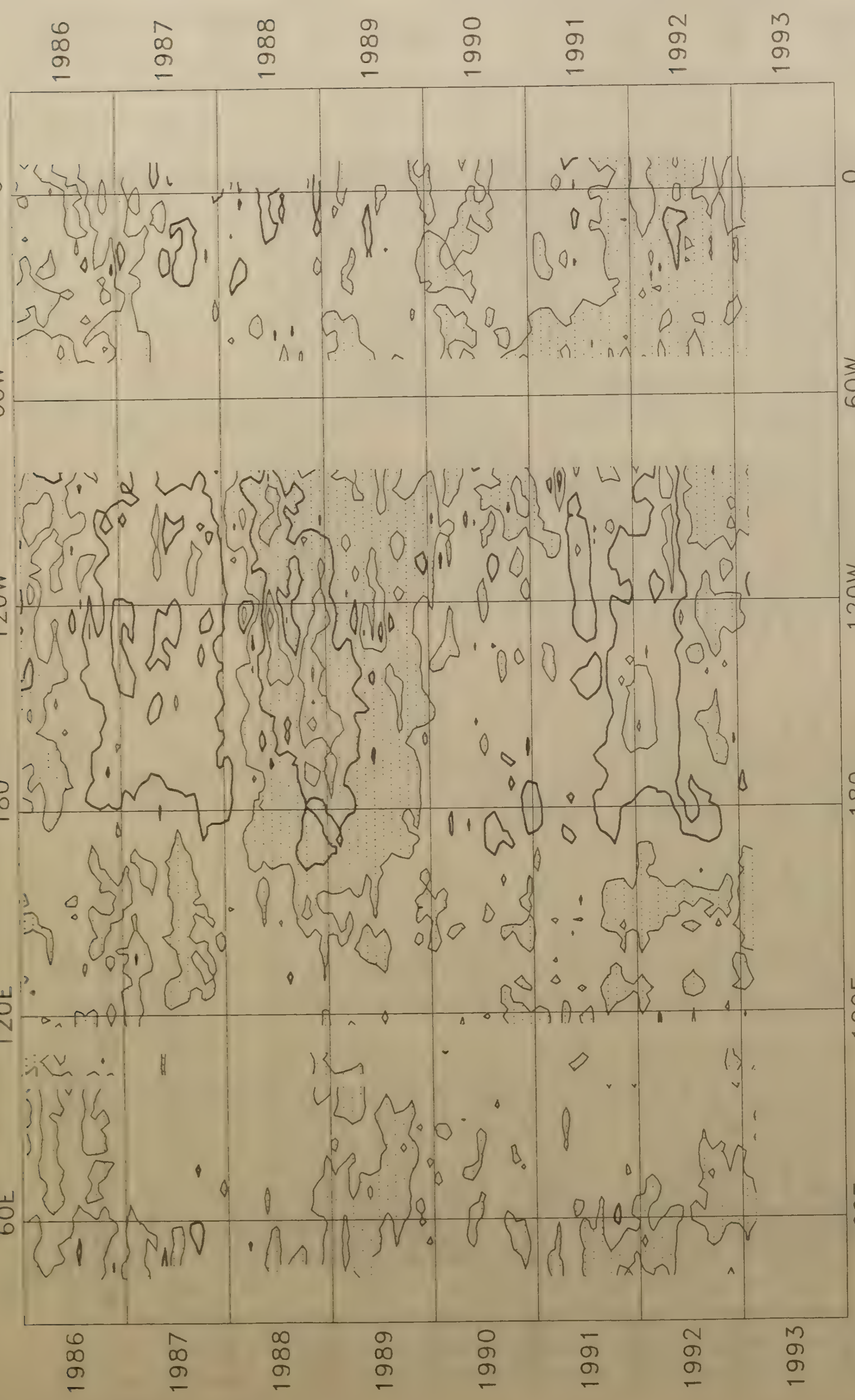
Fig.6 Time series of monthly mean SST anomalies in the equatorial Pacific Ocean for the areas indicated at the bottom of the figure. Thin lines show the monthly values and thick lines their 5 month running mean. Positive anomalies (A,B,C) and negative anomalies (D) are shaded. Anomalies are computed with respect to the JMA climatology (1961−90).



第7図　赤道に沿う海面水温時系列図

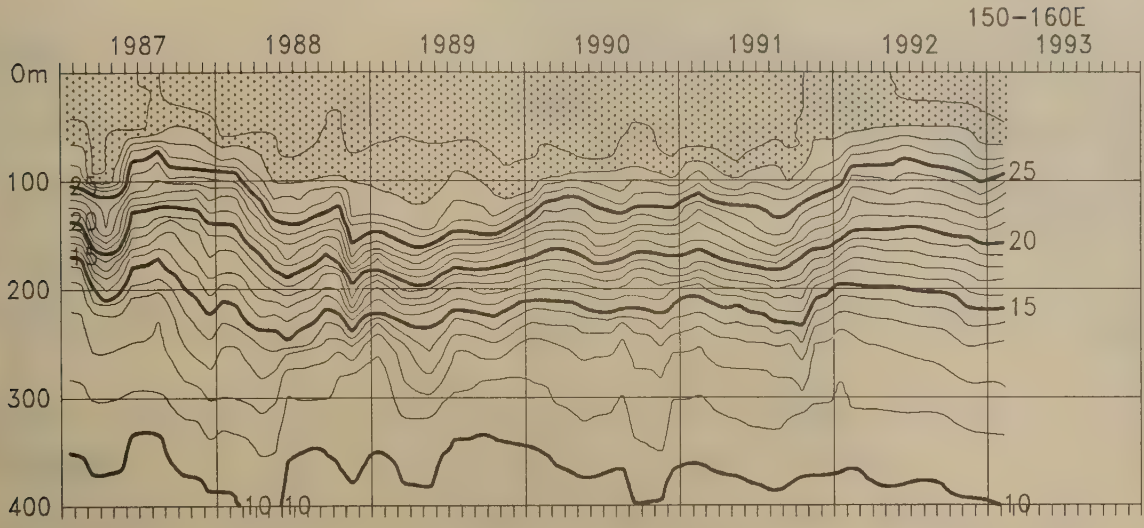
Fig.7 Time-longitude section of SSTs along the equator (2° N-2° S) in the global ocean. The contour interval is 1° C, with thick contour lines at 25 and 30° C. SST values greater than 28° C are spotted and values less than 23° C are shaded.

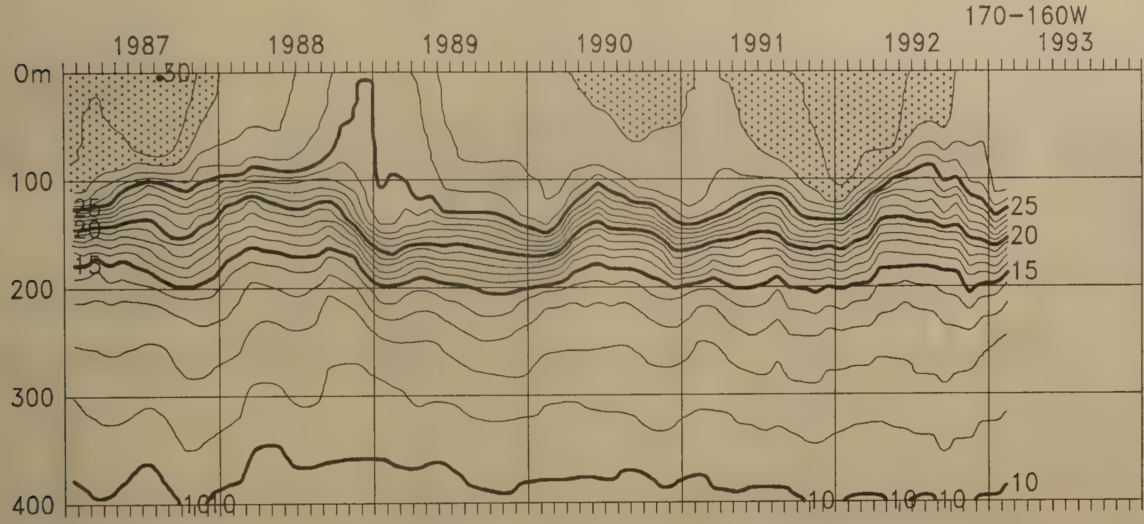
Time−Longitude Section of SST Anomalies

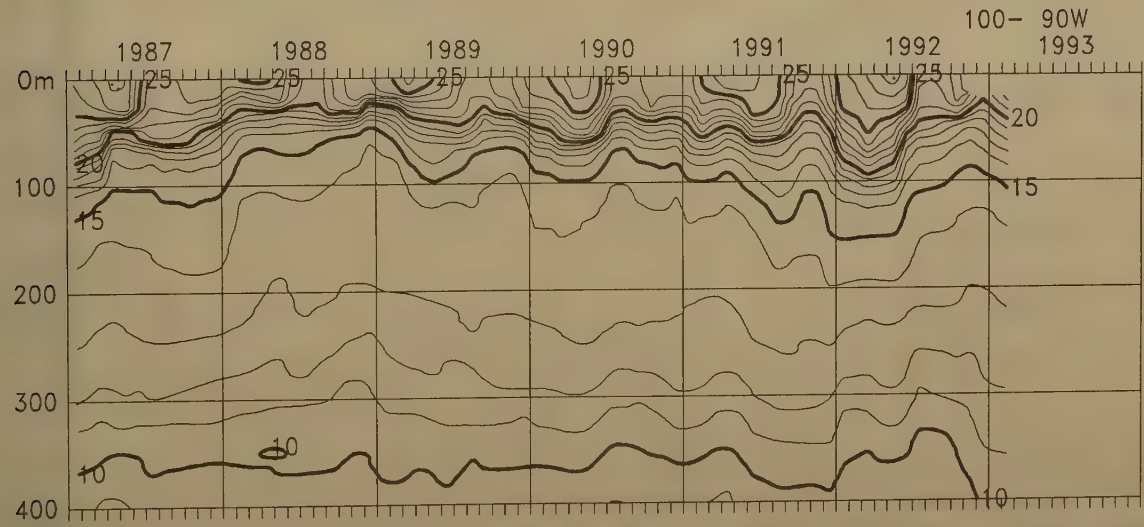


第8図　赤道に沿う海面水温偏差時系列図

Fig.8 Time−longitude section of SST anomalies along the equator (2° N−2° S) based on the JMA climatology (1961−1990). The contour interval is 1° C, with thick contour lines at +1° C and −1° C. Negative anomalies are spotted.

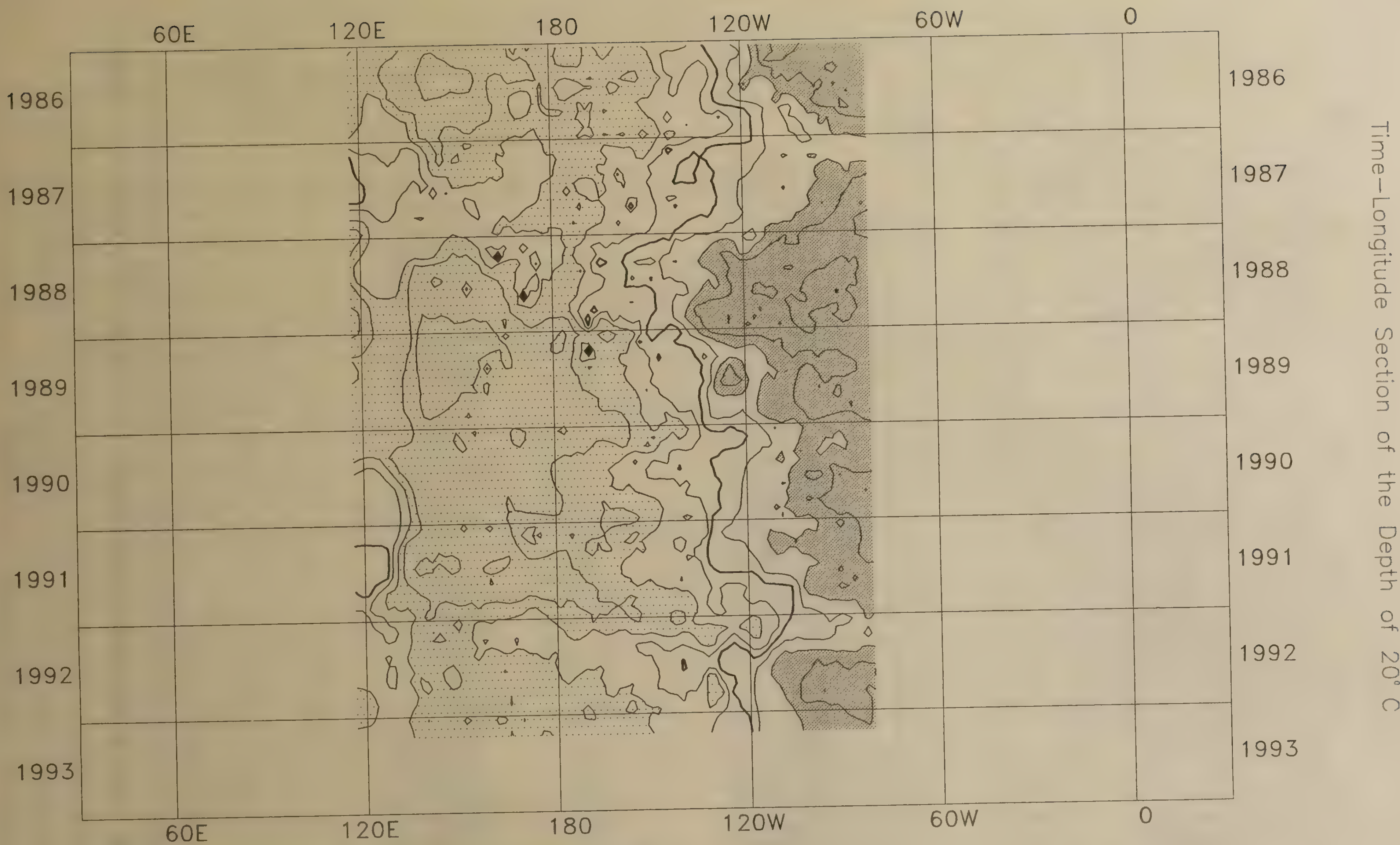






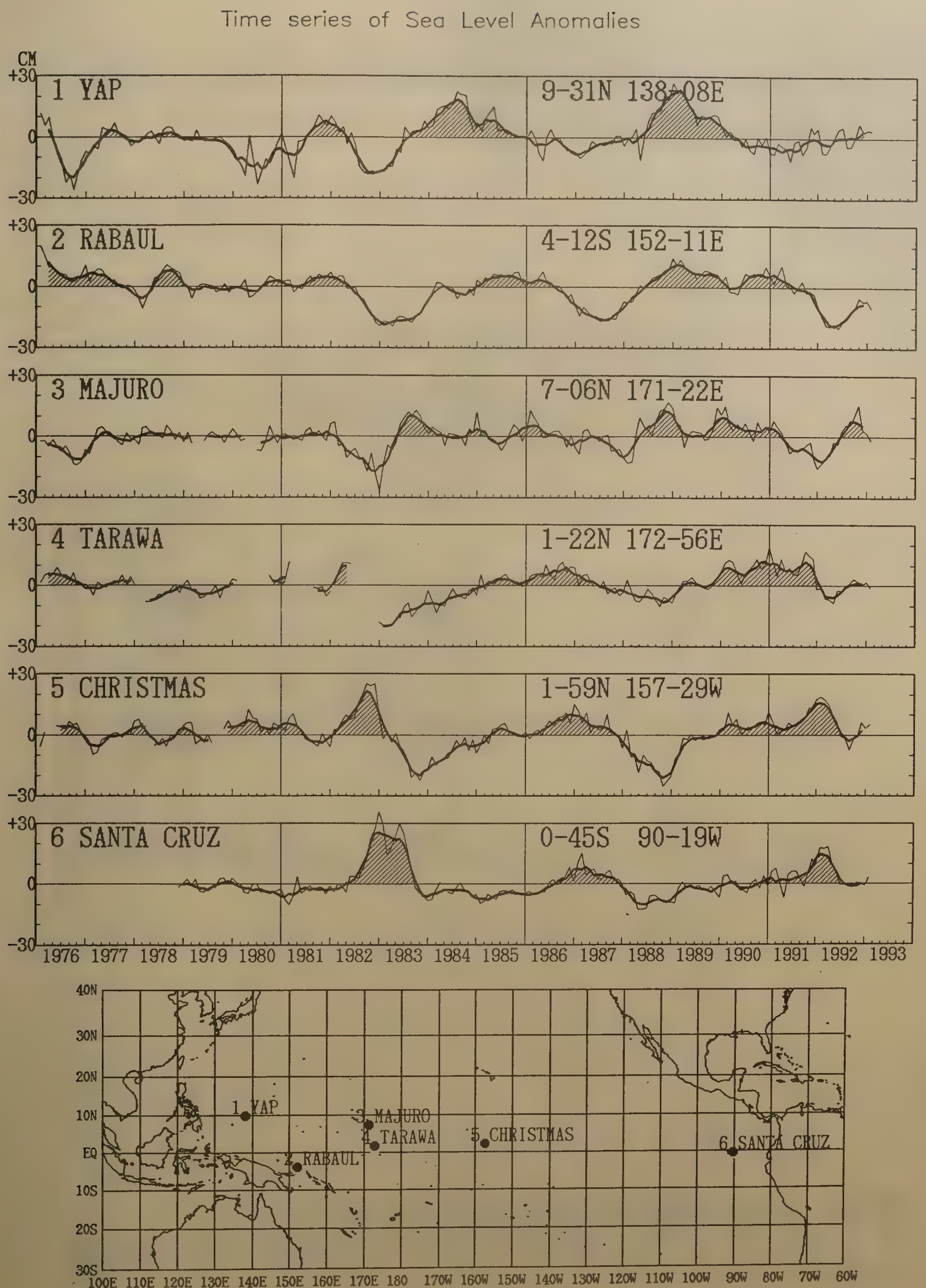
第９図　赤道太平洋表層水温時系列図（上：西部、中：中部、下：東部）

Fig.9 Time series of equatorial (2° N–2° S) subsurface temperature for the western Pacific (top, 150–160° E), the central Pacific (middle, 170–160° W) and the eastern Pacific (bottom, 100–90° W). The contour interval is 1° C with spotted shading for the values greater than 28° C.



第10図　太平洋の赤道に沿う20℃深度時系列図

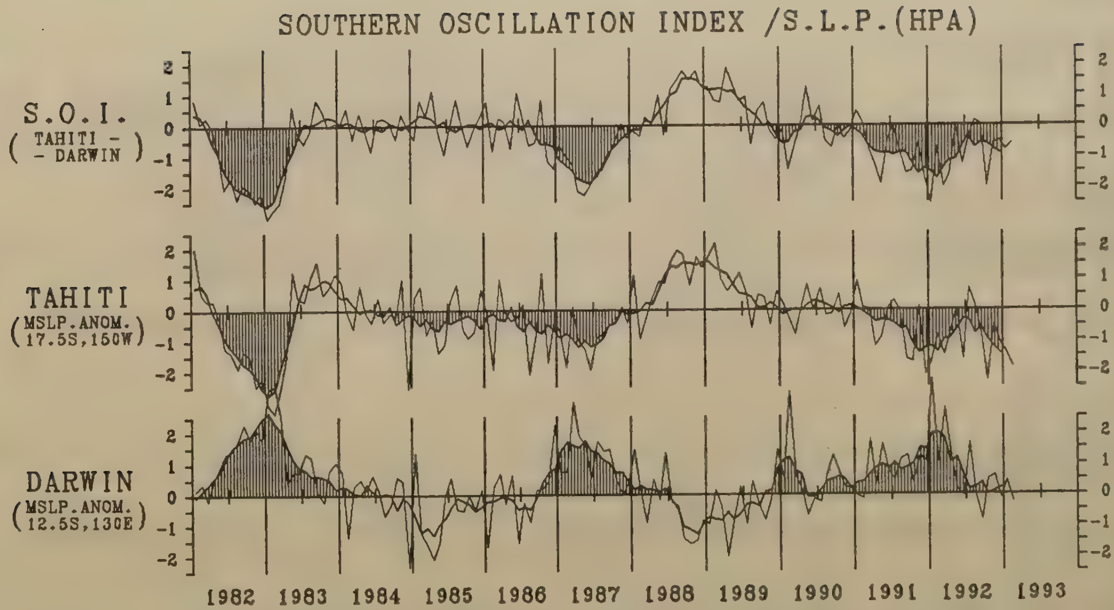
Fig.10 Time–longitude section of the depth of a 20° C isotherm along the equator in the Pacific Ocean. The contour interval is 20m with thick contour lines at 100m. Values shallower than 60m are shaded and those deeper than 140m are stippled.



第11図　太平洋月平均海面水位偏差時系列図

Fig.11 Time series of sea level anomalies based on 1976 to 1990 monthly mean sea level obtained from the stations indicated at the bottom of the figure. Thin lines show the monthly mean and thick lines show their 5 month running mean. Positive anomalies are shaded.

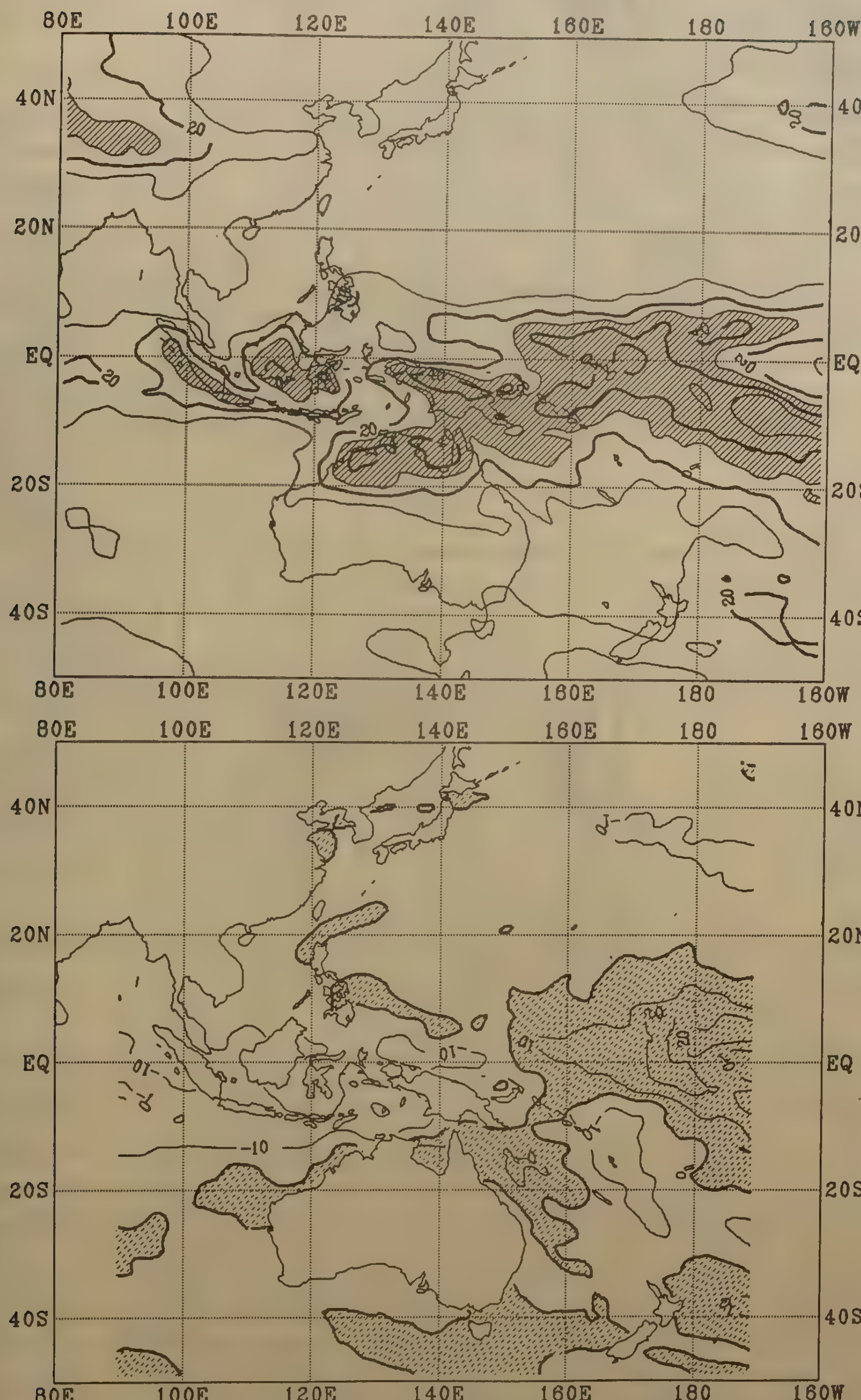
Time series of SOI & Sea Level Pressure Standardized Anomalies



第12図　南方振動指数及び海面気圧偏差時系列図

Fig.12 The Southern Oscillation Index (top) and monthly mean sea level pressure standardized anomalies at Tahiti (middle) and Darwin (bottom). Thin lines show the monthly mean and thick lines their 5 month running mean. Negative values (top, middle) and positive values (bottom) are shaded. Base periods for normals and standard deviations are 1961−1990. This figure is prepared by the Long−range Forecast Division, JMA.

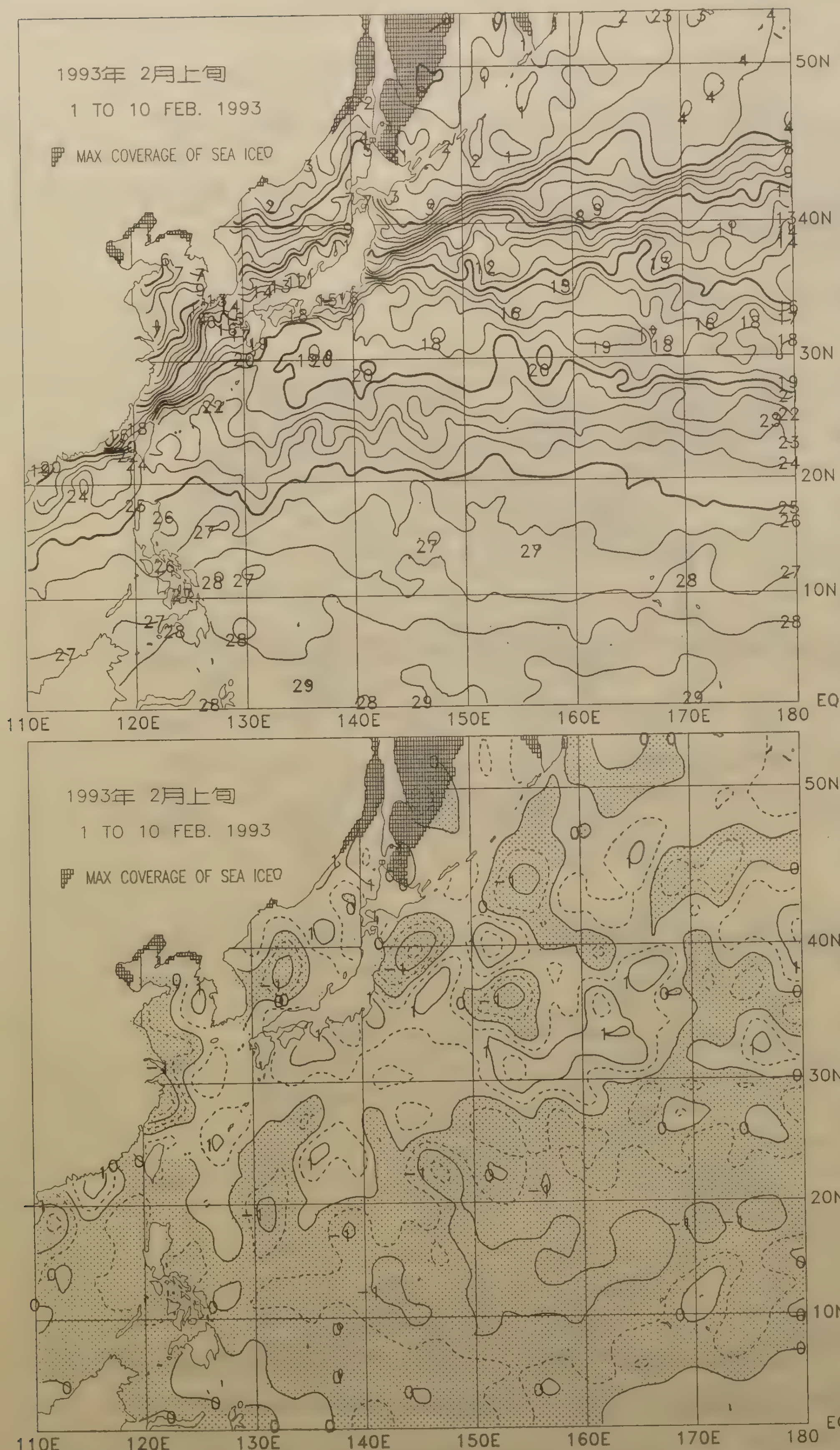
High-Cloud Amount & Anomalies



第13図　月平均上層雲量分布図及び偏差図（1993年 2月）

Fig.13 Monthly mean of the high-cloud amount (%, top) and its anomalies (%, bottom) in the equatorial Pacific for FEB 1993. The contour interval is 10%. Areas above 30% are shaded (top) and positive anomalies are stippled (bottom). Anomalies represent a departure from the 1978-1990 base period monthly means. This figure is prepared by the Long-range Forecast Division, JMA.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

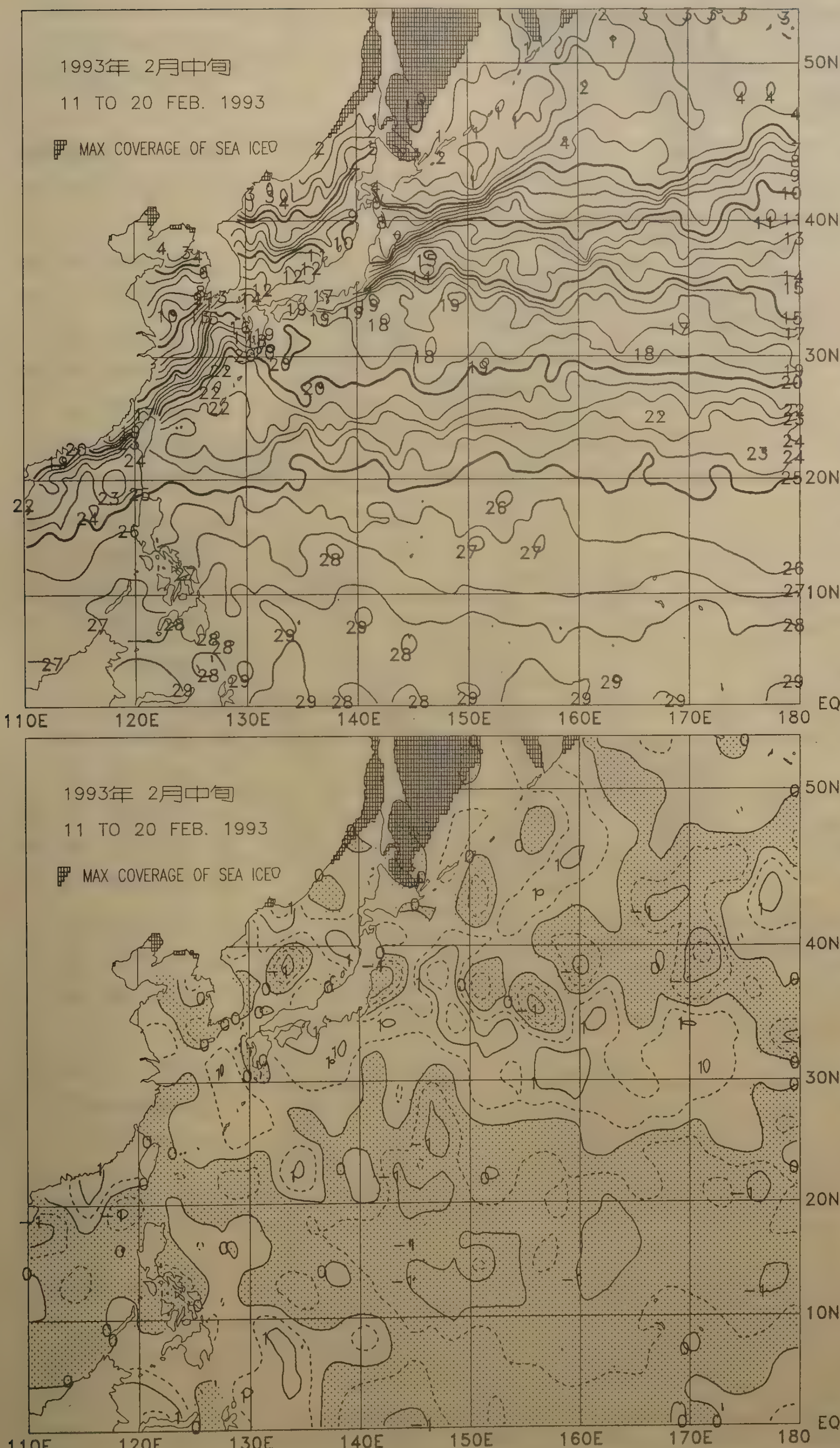
地名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島 (47918)	22.2	+1.9
那覇 (47936)	21.3	+0.7
名瀬 (47909)	20.4	-
足摺岬 (47898)	17.8	+2.2
潮岬 (47778)	17.5	-
御前崎 (47655)	11.0	+0.5
八丈島 (47678)	18.4	+1.7
館山 (47672)	14.0	+0.4
小名浜 (47598)	8.8	-0.9
宮古 (47585)	7.9	+0.5
浦河 (47426)	2.1	+1.4
紋別 (47435)	0.0	-
稚内 (47401)	1.3	-
寿都 (47421)	6.0	-
江差 (47428)	5.8	-
飛島 (47587)	9.1	+0.3
輪島 (47600)	8.8	+0.7
西郷 (47740)	13.2	-
浜田 (47755)	11.7	-
厳原 (47800)	14.0	-
牛深 (47838)	14.9	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,145.4E	12.3
四国沖	29.0N,135.0E	20.1
東シナ海	28.2N,126.3E	20.8

第14図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 2月上旬)

Fig.14 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 1st ten day period in FEB 1993. Anomalies are computed with respect to the JMA climatology (1961-90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.



旬平均沿岸水温(℃)
Coastal Water Temperature

地 名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	22.2	+1.4
那 覇(47936)	22.0	+1.5
名 瀬(47909)	20.3	-
足摺岬(47898)	17.0	+1.4
潮 岬(47778)	17.6	-
御前崎(47655)	11.5	+0.8
八丈島(47678)	18.2	+1.3
館 山(47672)	13.1	−0.4
小名浜(47598)	8.6	−1.0
宮 古(47585)	7.8	+1.0
浦 河(47426)	1.5	+0.8
紋 別(47435)	−0.8	-
稚 内(47401)	0.3	-
寿 都(47421)	6.2	-
江 差(47428)	5.3	-
飛 島(47587)	8.9	+0.4
輪 島(47600)	8.2	+0.3
西 郷(47740)	12.8	-
浜 田(47755)	12.0	-
厳 原(47800)	14.2	-
牛 深(47838)	14.8	-

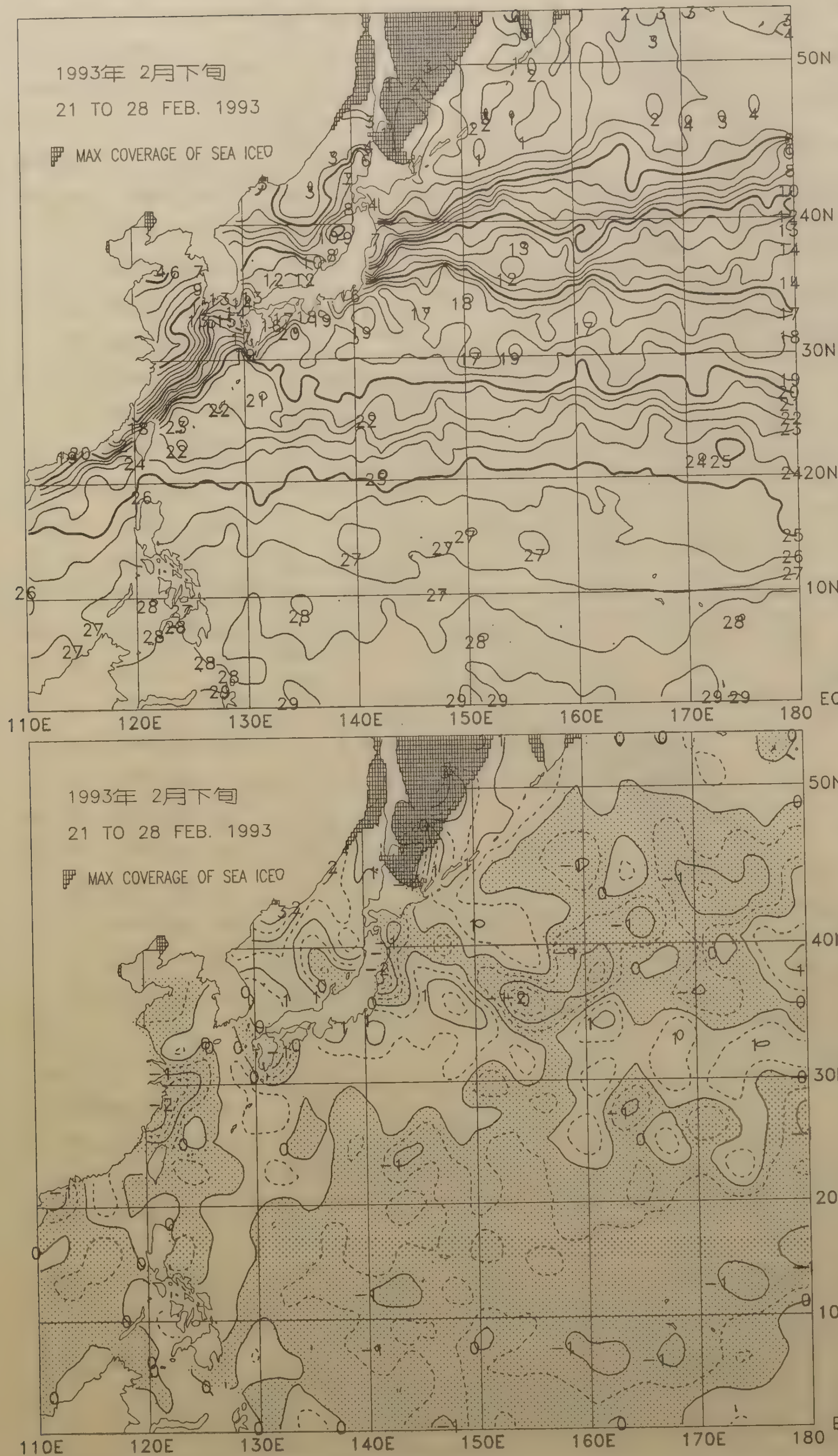
海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

地点	位置	水温
日本海	37.9N,145.4E	11.9
四国沖	29.0N,135.0E	19.9
東シナ海	28.2N,126.3E	20.7

第15図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 2月中旬)

Fig.15 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 2nd ten day period in FEB 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1°C and additional anomaly contours of 0.5°C are shown. Negative anomalies are stippled.

Ten-day mean SST & Anomalies



旬平均沿岸水温(℃)
Coastal Water Temperature

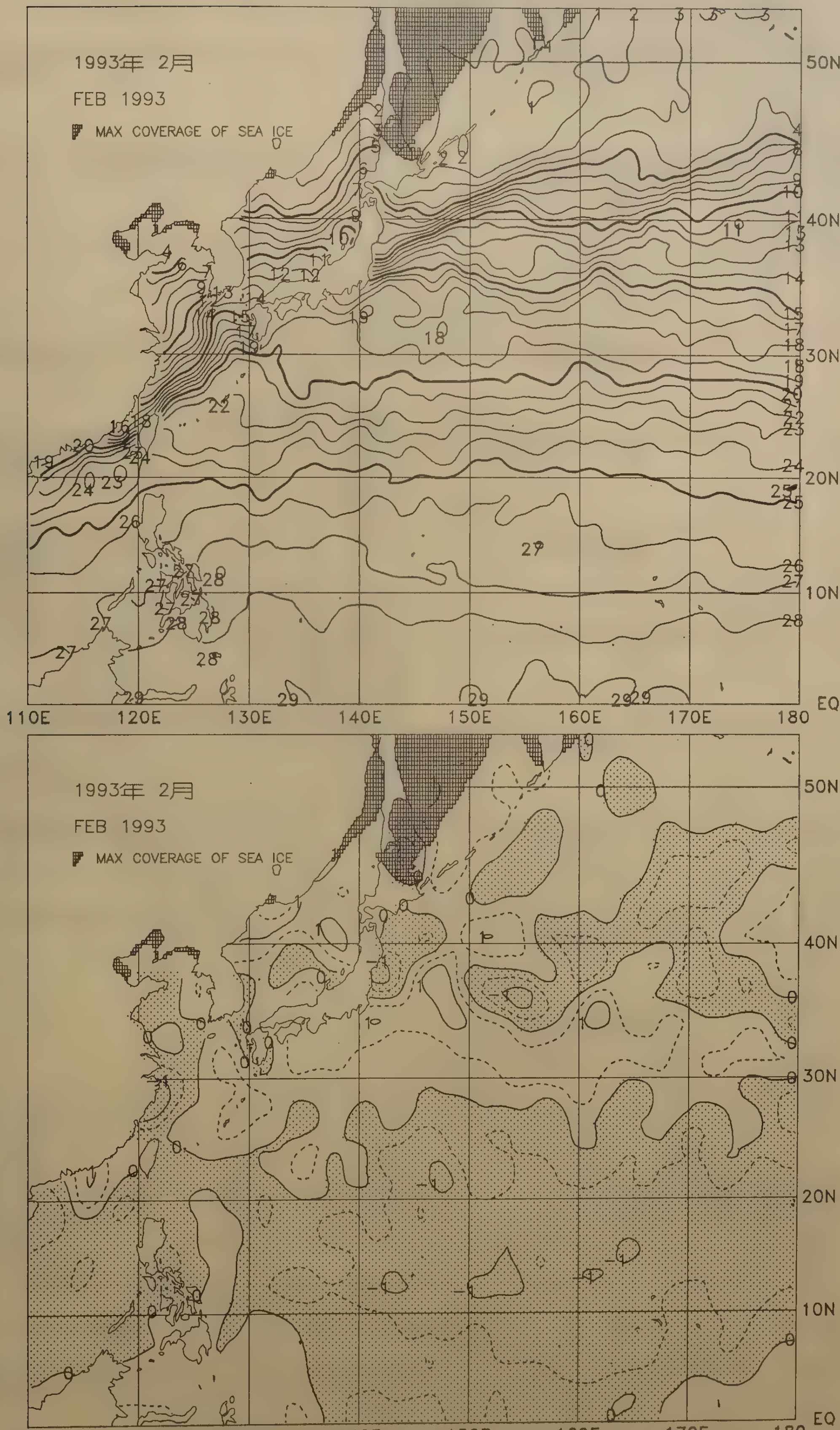
地 名 (Index Number)	水温 Temp.	偏差 Anom.
石垣島(47918)	21.8	+0.9
那 覇(47936)	21.0	+0.6
名 瀬(47909)	20.0	-
足摺岬(47898)	16.0	+0.4
潮 岬(47778)	16.3	-
御前崎(47655)	13.0	+2.0
八丈島(47678)	17.8	+1.0
館 山(47672)	14.0	+0.8
小名浜(47598)	8.4	-0.7
宮 古(47585)	7.5	+1.5
浦 河(47426)	-	-
紋 別(47435)	-1.0	-
稚 内(47401)	-	-
寿 都(47421)	6.6	-
江 差(47428)	6.9	-
飛 島(47587)	9.1	+0.8
輪 島(47600)	8.8	+1.0
西 郷(47740)	12.5	-
浜 田(47755)	12.0	-
厳 原(47800)	13.8	-
牛 深(47838)	16.0	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,145.4E	11.8
四国沖	29.0N,135.0E	19.6
東シナ海	28.2N,126.3E	20.2

第16図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1993年 2月下旬)

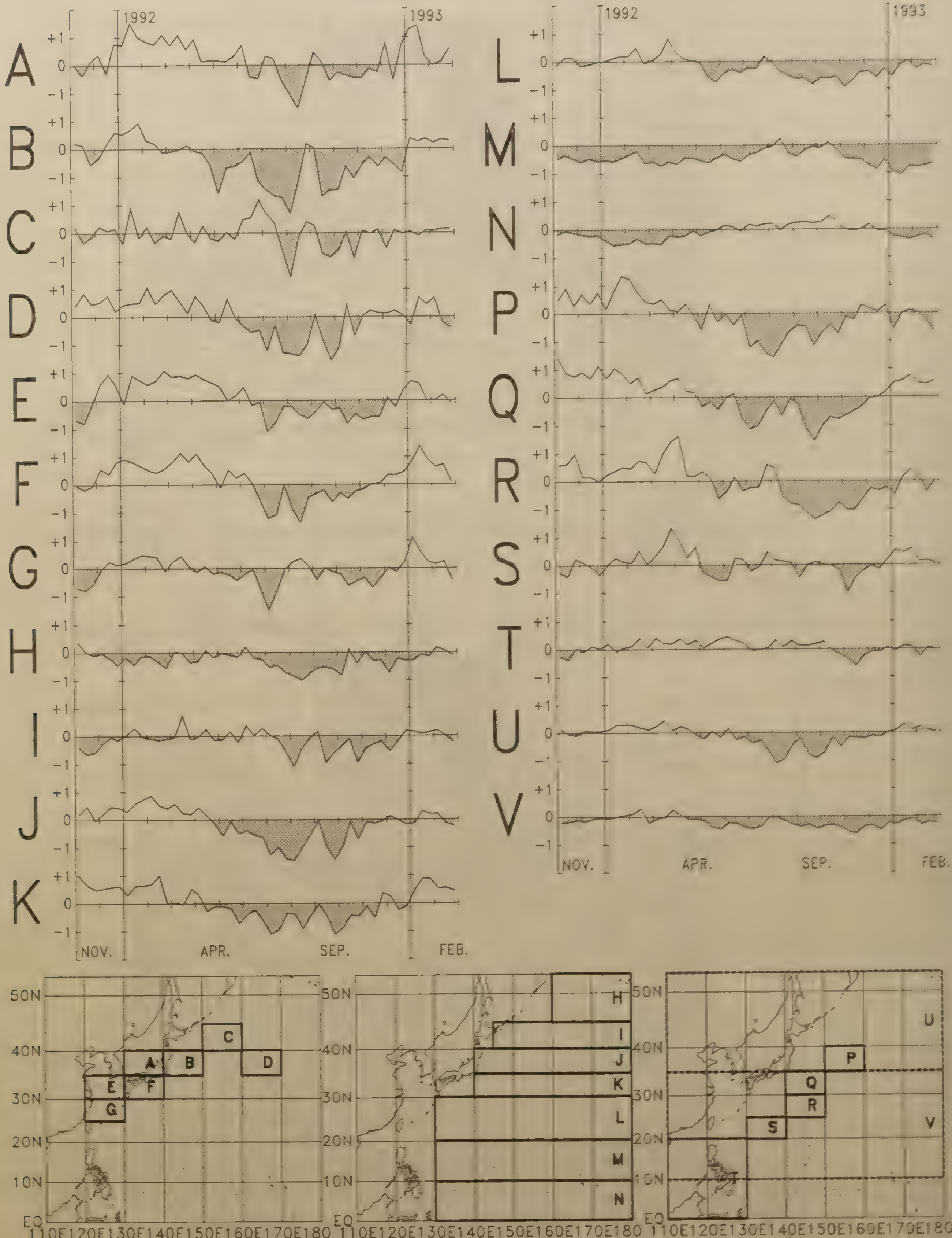
Fig.16 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 3rd ten-day period in FEB 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.



第17図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1993年 2月)

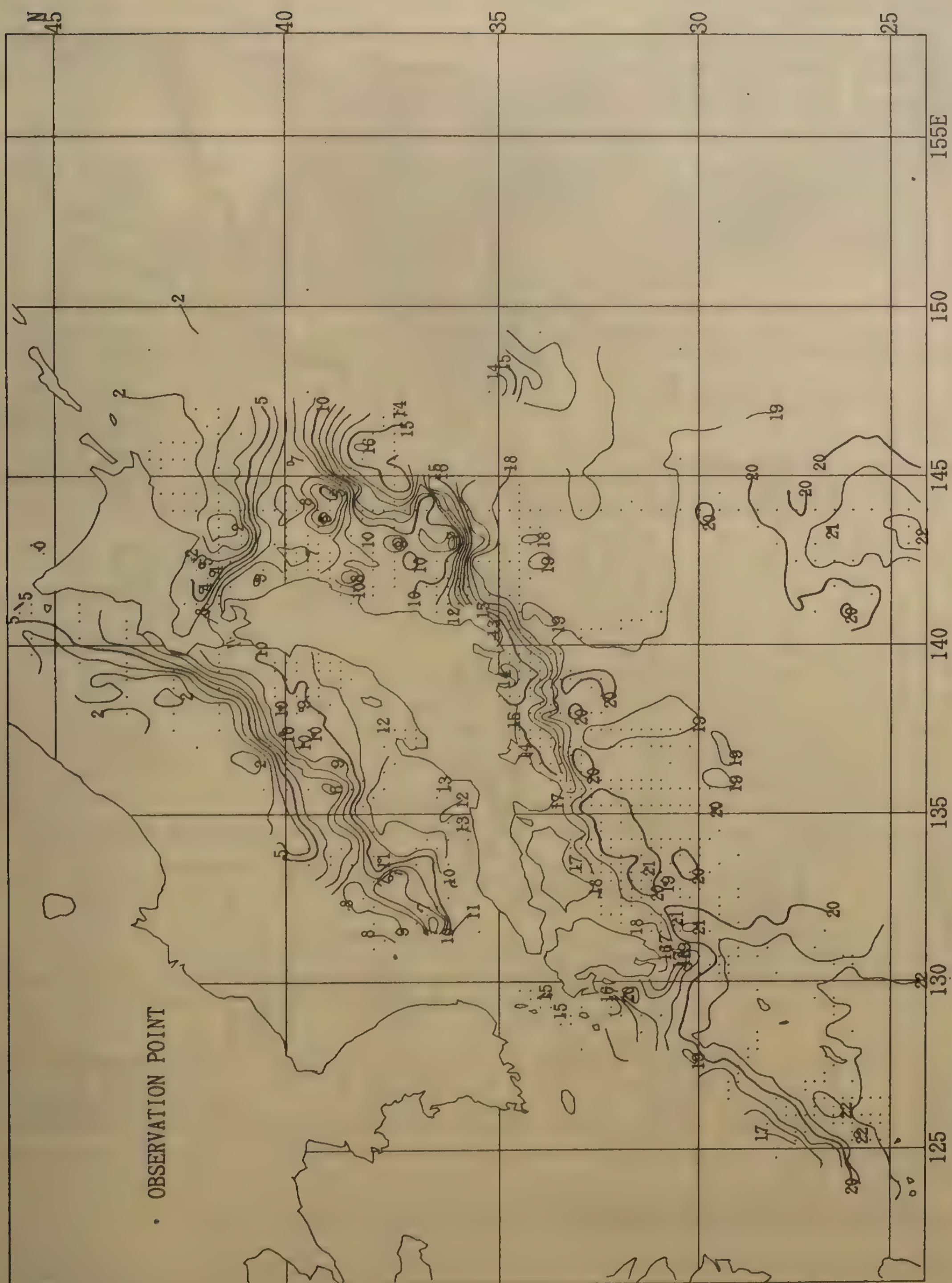
Fig.17 Monthly mean SSTs in the western North Pacific (top) and anomalies (bottom) for FEB 1993. Anomalies are computed with respect to the JMA climatology (1961–90). The contour interval is 1° C and additional anomaly contours of 0.5° C are shown. Negative anomalies are stippled.

Time Series of Area Mean SST in the Western North Pacific



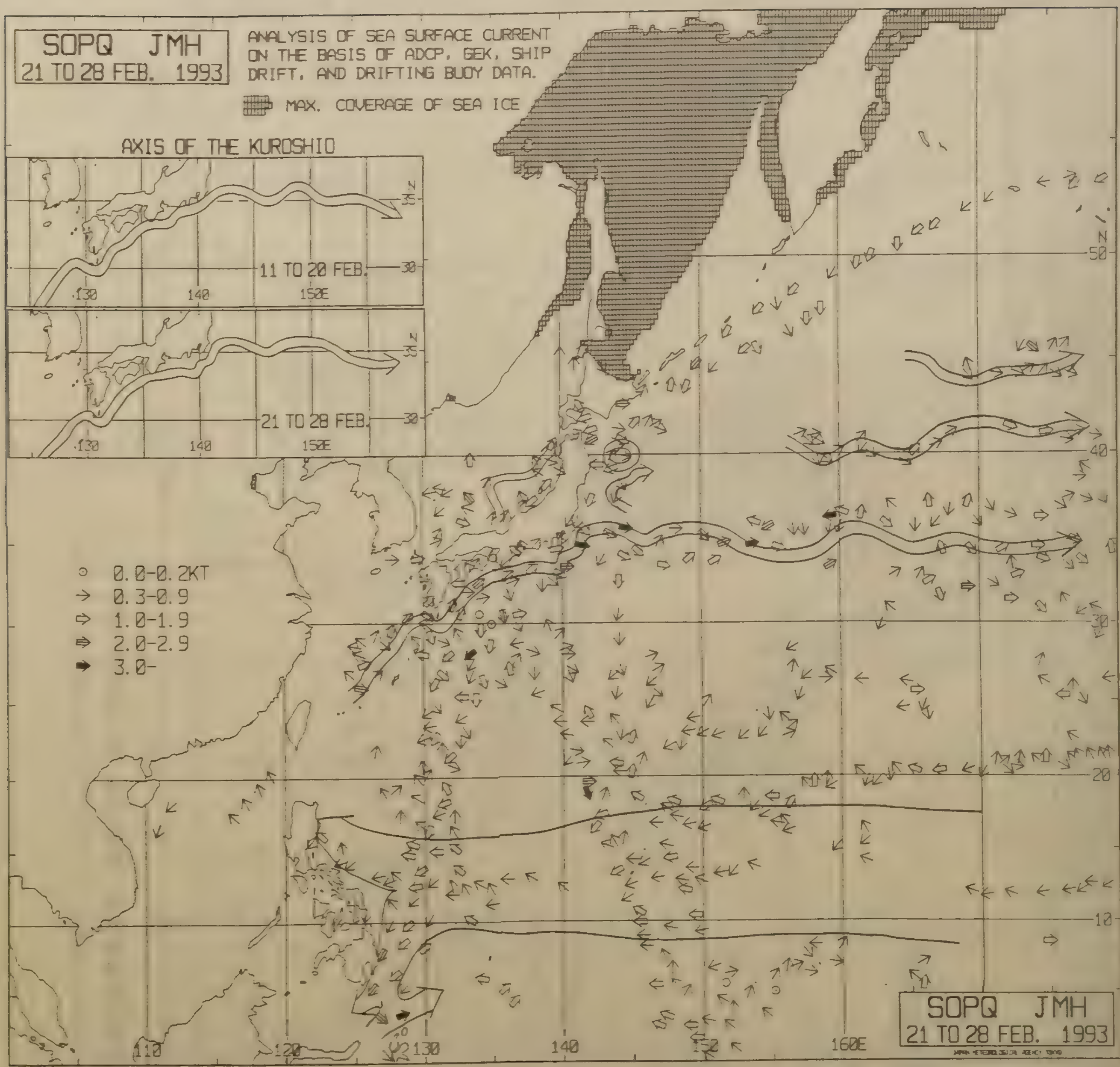
第18図　北西太平洋旬平均海面水温平年偏差時系列図

Fig.18 Time series of the ten−day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas indicated at the bottom. Negative anomalies are shaded. Anomalies are computed with respect to the JMA climatology (1961−90).



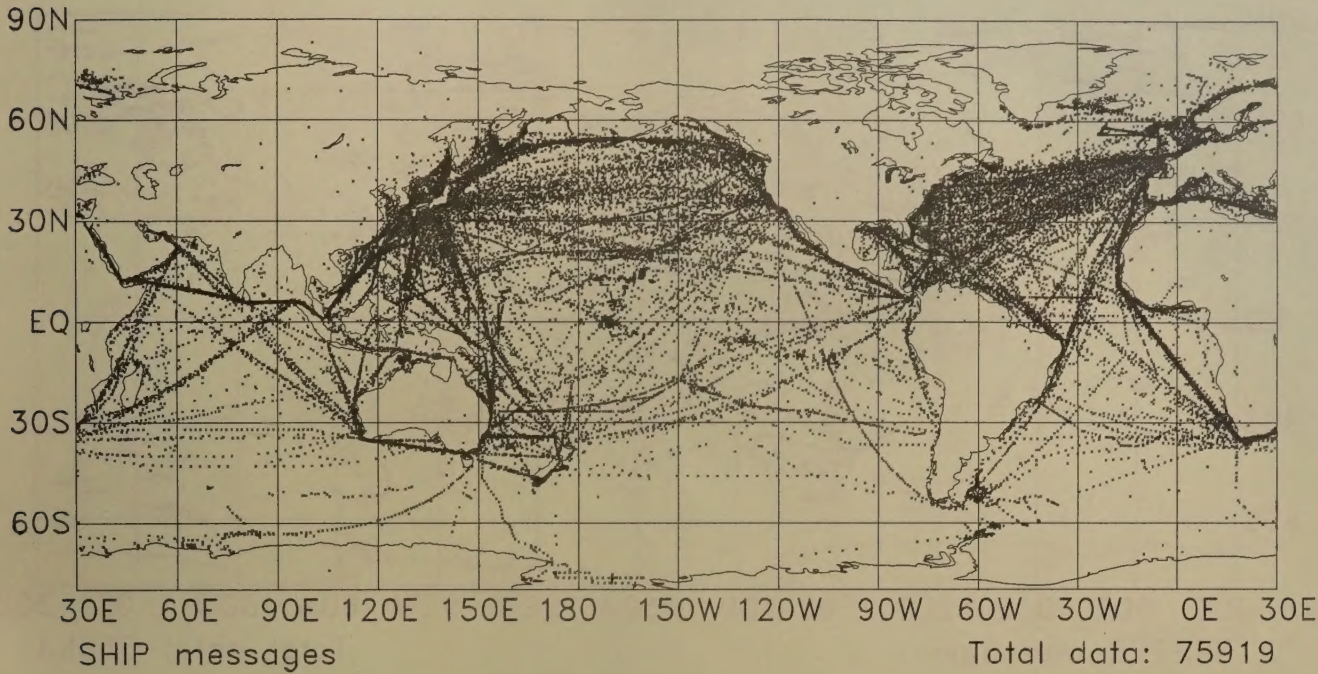
第19図　日本近海表層水温（深さ100M）図（1993年 2月）

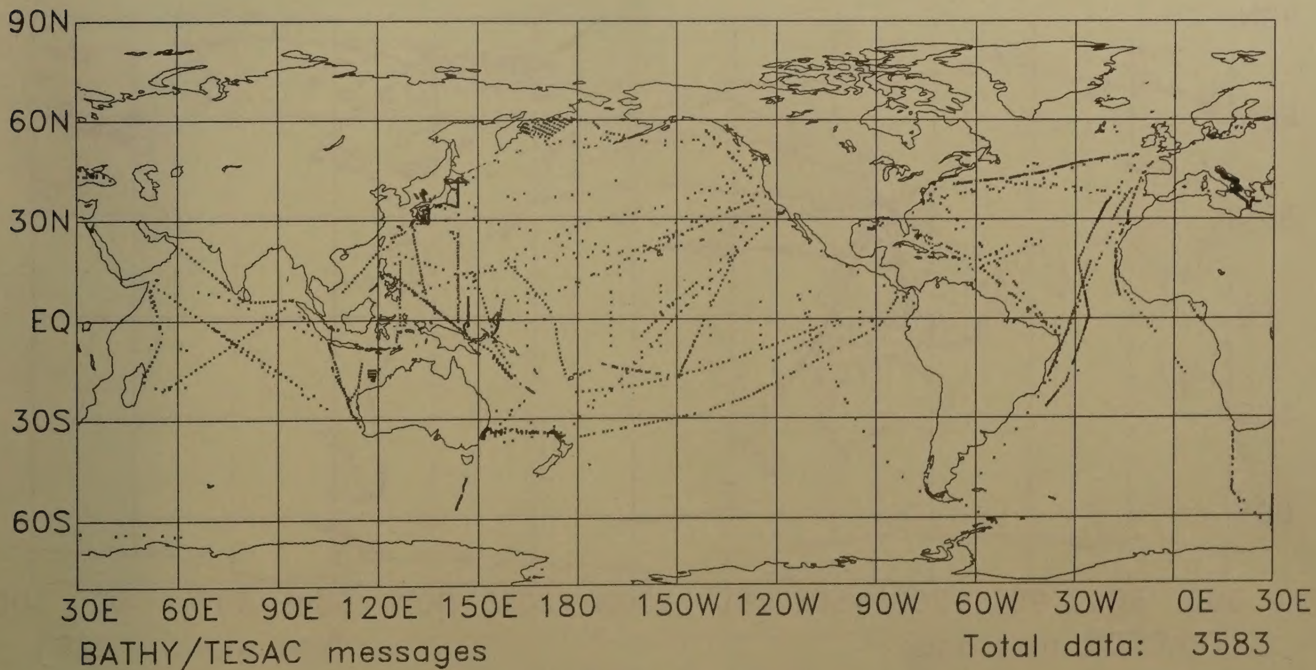
Fig.19　Subsurface (100m) temperatures in seas adjacent to Japan for FEB 1993.



第20図　北西太平洋旬平均海流図（1993年 2月下旬）

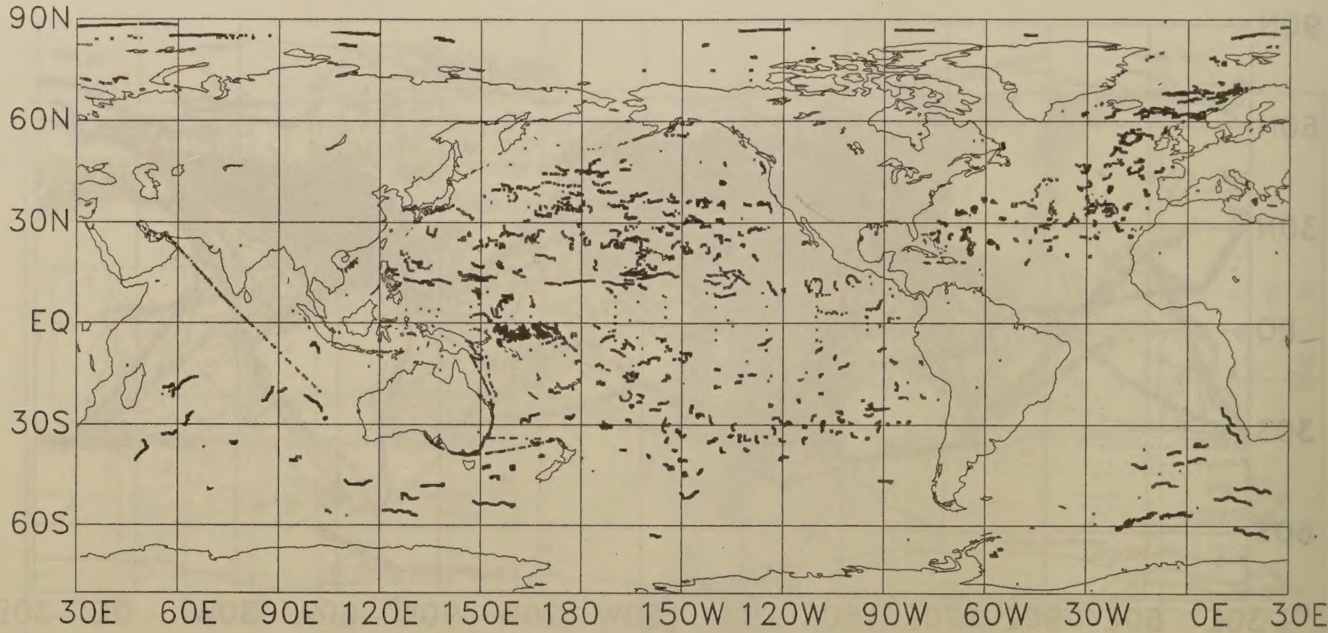
Fig.20 Ten-day analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in FEB 1993. Small arrows indicate sea surface currents measured with acoustic Doppler current profilers, GEK's deployed in research vessels, and ship drift by merchant ships/drifting buoys during the month. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.



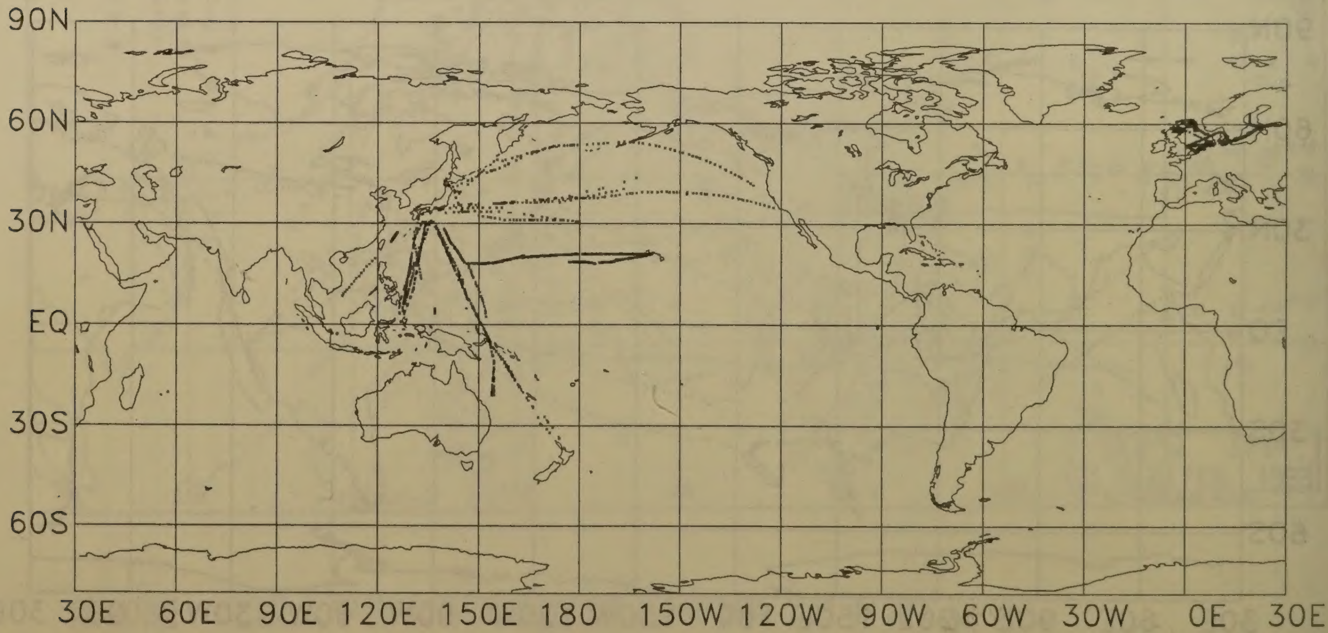


第21-1図　測点分布図(1993年 2月)

Fig.21−1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for FEB 1993.



DRIFTER messages Total data: 55064



TRACKOB messages Total data: 2263

第21-2図 測点分布図(1993年 2月)

Fig.21-2 Geographical distribution of DRIFTER messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for FEB 1993.

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